ALCOHOLIC BEVERAGES

THE COMPARATIVE MORTALITY OF ABSTAINERS AND NON-ABSTAINERS

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THE COMPARATIVE MORTALITY OF ABSTAINERS AND NON-ABSTAINERS.

TWO PAPERS

BY

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PROVIDENT INSTITUTION,

AND BY

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36852

LONDON SCHOOL OF HYGIENE
5 JUN 1950
AND TROPICAL MEDICINE

[*Extracted from* "THE JOURNAL OF THE INSTITUTE OF ACTUARIES,"
Vol. XXXVIII, p. 213. (January 1904.)]

ON THE COMPARATIVE MORTALITY AMONG ASSURED LIVES OF ABSTAINERS AND NON-ABSTAINERS FROM ALCOHOLIC BEVERAGES.

BY

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Actuary to the United Kingdom Temperance and General Provident Institution.

INTRODUCTION.

(1.) THE effect of alcohol on the human economy and on the health and prosperity of the community has occupied the close attention of statesmen, physiologists and philanthropists for many generations past, and the question of total abstinence has been probably the most widely discussed social problem for more than half a century. That excess, as compared with moderation in the use of alcohol, is prejudicial in every way is a proposition hardly to be disputed. And many authorities who have given the matter careful consideration contend that even as moderation is superior to excess, so is total abstinence from alcohol superior to moderation. It is the purpose of this paper to examine the truth of this contention in regard to Mortality; with which must be closely associated the questions of health and general well being.

(2.) In our daily experience we know that of all the points to be considered in connection with a proposal for Life Assurance, by far the most important, in the majority of cases, is the question of "habits", by which general term "habits" in this connection we nearly always refer to the use, moderately or otherwise, of alcoholic beverages. This fact gives importance to the subject from a technical standpoint.

(3.) But if any further apology be necessary for bringing this question forward, I may be permitted to refer to the remarks of our President in his opening address last session in which (pp. 369–370 of the *Journal* for January 1903) he points out that no "Actuary of these Societies" (*i.e.*, Assurance Societies which distinguish between Abstainers and Non-Abstainers) "has ever "made any contribution to our proceedings giving particulars of "the experience of so-called Temperance Sections. It is much to "be desired that we should have detailed information on a matter "so important . . . . proving with minute and scientific "accuracy the truth of the oft repeated assertions as to the effect "of total abstinence upon the duration of life." I trust the figures I have now the privilege of submitting to you, will help to fill the void pointed out by our President.

(4.) Some eighteen months back the writer was requested by the Directors of the United Kingdom Temperance and General Provident Institution to continue, and complete to the end of the year 1901, the investigation made nearly twenty years previously by Mr. R. P. Hardy, into the mortality arising among the Members of that Institution to the end of the year 1882, with special reference to the relative mortality of Total Abstainers from alcoholic beverages and Non-Abstainers. This work has now been completed, and, by permission of the Institution's Directors, the results are embodied herein.

HISTORY AND PRACTICE OF THE INSTITUTION.

(5.) It is necessary to give some account of the Office whose statistics we are dealing with. The United Kingdom Temperance and General Provident Institution was founded in 1840, under the name of the United Kingdom Total Abstinence Life Association (which title was altered about a year later to Temperance Provident Institution) for the Mutual Assurance of the lives of Total Abstainers only. The premiums were somewhat lower than those now charged, and were not intended to yield any substantial profit. Its first Policy was dated 14 January 1841, and was granted on the life of one of its founders, who died so recently as 1896, in his 82nd year.

(6.) In 1849, Non-Abstainers were admitted, and the present title and scale of premium were adopted about 1851. The same premiums have since been charged for both Abstainers and Non-Abstainers, the former receiving any advantage arising from their superior vitality, in the form of additional bonus.

(7.) Persons are eligible for the Temperance Section who do not take alcohol as a beverage in any form. The continued adherence of the assured to the principles of Abstinence is checked by an annual declaration to that effect. Such persons are described throughout this paper as "Abstainers", "Temperance Lives", or "Teetotalers." Persons who do not come within these conditions are eligible for the "General Section" only, and are herein described as "Non-Abstainers." If an Abstainer cease to abstain he is transferred to the General Section, and on the other hand, policyholders in the General Section who become Abstainers are generally eligible for transfer to the Temperance Section. The effect of these "Transfers" on the Mortality of the two sections respectively will be dealt with later on in this paper, but it may be here stated that such transfers are not made if the assured be known to be in bad health or of intemperate habits, and transfers from the Temperance Section are not now made in the cases of persons over 70 years of age. Moreover, the "Transfers" are comparatively very few in number. A complete record has been kept throughout the career of the Institution of the section (Temperance or General) in which every policy has been included year by year, and of any transfers between those sections. Some 125,000 Policies have been issued to the end of 1901, including Endowment Assurances, Joint Life Assurances, Annuities, and other special Policies.

(8.) The same care is exercised in admitting a new applicant into either section as regards family history and personal condition. But, possibly if there were any unfavourable information on either of these points the case may have a better chance of acceptance if the life be an Abstainer. It should thus be made clear that the Temperance Section has never been favoured or nursed, with the view of securing more favourable mortality results, either by the admission of unexceptionable lives only in the first instance or by the removal or transfer of inferior or doubtful lives.

(9.) As far as it is possible to generalize over so long a period as 61 years, it may be said that the practice of the Institution has been throughout as described in paragraphs 7 and 8. The writer can speak from personal knowledge in reference to the last 25 years, and from information derived from the knowledge of past and present officials extending over nearly the whole of the period under observation.

(10.) A question of importance is the relative pecuniary positions of the persons assured in the two sections of the Institution. Table I shows the average sum assured of the whole-life participating policies in force at each quinquennial valuation from 1865 onwards, in the Abstainers' and Non-Abstainers' Sections respectively. It will be seen that they are approximately equal throughout, although the Non-Abstainers show a small superiority. On the other hand, it will be seen hereafter in Tables III and IV that the Abstainers enter at a rather younger average age than the Non-Abstainers. It will also be seen that the average sum assured has steadily increased in each section.

Table I.

Showing the average Sum Assured in the Institution in force at successive Valuations. Whole-Life Participating Policies.

Year	Abstainers	Non-Abstainers
	£	£
1865	187	198
1870	191	205
1875	208	220
1880	230	232
1885	252	246
1890	265	264
1895	285	289
1900	299	321

Average Sum Assured under Whole-Life Participating Policies as per last Valuation Returns of seven leading Ordinary Life Offices, transacting mainly a provident class of business	£575

From these figures it may reasonably be assumed that the positions in life of the assured in the two sections are much the same, and this view is confirmed by my knowledge of the working of the Institution's business.

In the same table I have shown the average sum assured in force in seven selected Offices transacting a large business, mainly of what may be called a provident character as distinguished from that connected with Mortgages, &c. I have not included any of the "Law" Offices or any Offices effecting Industrial business. It will be seen that the average is nearly double that of the Institution in 1900.

Method of Dealing with the Data.

(11.) Particulars of each Policy issued by the Institution were taken on a card of similar form to that used by the English

Offices in the first (20 Offices) experience of the Institute of Actuaries. The card is as follows: the letters in brackets being added here for reference.

Pol. No. (*a*) Dept. (*b*) £ (*c*)

With Profits. (*d*) Nature of Assurance (*e*)

Life...Sex.......................... (*f*) (*g*)

Rated up (*h*) years

How rated up (*i*)

Year of Entry (*j*) 18

Year of Exit (*k*) $l^{\underline{a}}$ 18

True age at Entry (*m*)

True age at Exit (*n*) $n^{\underline{a}}$

Mode of Exit (*o*)

(*l*)

Cause of Death (*p*)

Remarks

(*a*) Policy Number. Policies for every number from 1 to 125,007 have been issued, with the exception of 330 numbers omitted for some unknown reason in the year 1850. The cards were therefore mechanically numbered by the printer, and every Policy thus accounted for. The final disposal by lapse, surrender, death or otherwise was ascertained from the Policy registers. As a further check, particulars of all cancelments were taken on separate small slips, which were sorted into numerical order and collated with the cards. The cards which then remained as not cancelled were compared with the Registers of Policies existing at 31 December 1901. By these means it was guaranteed (1) that every Policy was included in the observations; (2) that no cancelled Policy could be treated as still in force; and (3) that all the deaths were included.

(*b*) Department. This is for office purposes, and shows the nature of the Policy, and whether in the Temperance or General Section.

(*c*) The sum assured.

(*d*) The syllable "out" was added for non-participating Policies. These were, however, very few in number, being less than 2 per-cent of the whole. (No use has been made of (*c*) and (*d*) in the present investigation).

(*e*), (*f*), and (*g*) These items do not call for any explanation.

(*h*) Rated up—years. The majority of "Rated-up" Policies issued since 1866 are charged with a decreasing debt, which extinguishes itself on completion of the expectation of life at the real entry age, and in some cases earlier. In the case of Endowment Assurances the debt is usually extinguished on the completion of the term of the Policy, that term being generally shorter than the expectation. The number of years to be added to the age, of which the debt is assumed to be the equivalent, is inserted in the space. In some few cases the premium corresponding to the advanced age has been paid. Where small extras for Gout, Rheumatism, Rupture, &c., have been added to and paid with the premium, the equivalent number of years' addition to the age has been inserted in the space. In the case of females, the extra for sex has in all cases been ignored in this investigation.

(*i*) How rated up; *i.e.*, Whether by decreasing debt, or by addition to the premium. But no distinction has been made between these cases.

(*j*) and (*k*) Years of entry and exit. These are calendar years. In the cases of Policies in force at the close, (*k*) was of course left blank.

(*l*) The difference between (*j*) and (*k*), namely—the duration of the Policy, was inserted at this point. If the Policy were in force the difference between the year of entry and 1901 was inserted in pencil at the point $l^{\underline{a}}$.

(*m*) This is, in the cases of lives accepted at ordinary rates, or rated up on the debt plan, the Office age next birthday corresponding to the premium. In cases where an extra is payable with the premium, it is the true age next birthday.

(*n*) The age of exit is obtained by adding the "duration" to the age at entry. If the Policy were in force this age was inserted in pencil at the point $n^{\underline{a}}$.

(*o*) Mode of exit. Void (or lapse), Surrender or otherwise cancelled, Matured Endowment (officially called Claim), Transfer from the Temperance to the General Section or *vice versa*, or Death were marked by the initial letters V, S, C, T and D respectively. Voids were dated as becoming so in the year in which the premium fell in default.

(*p*) Cause of death. Not inserted.

(12.) Ages and period at which the Policy was "Exposed to Risk." For Office entry age x, and duration n years, the exposure was half-a-year at age $(x-1)$, and in the case of Surrenders, Transfers and Matured Endowments, half-a-year at age $(x+n-1)$. In the case of Deaths and existing, a full year at age $(x+n-1)$. Under Voids, $\frac{3}{8}$th of a year at age $(x+n-1)$. Policies being renewable on the first days of January, April, July and October, they must go void on one of these dates, and the average exposure will therefore be $\frac{3}{8}$th of a year. For each of the intermediate ages between $(x-1)$ and $(x+n-1)$ of course a full year's exposure. It will be noted that when a Policy is transferred from the Temperance to the General Section it passes out of the observations. It is separately dealt with as a "Transferred" Policy from the date of such transfer, as will be explained later on. It will also be borne in mind that the general effect of these adjustments is to very slightly under-estimate the exposures, and correspondingly over-estimate the rates of mortality. The effect of this being almost infinitesimal, it is of no practical consequence.

It will be seen that the Institute of Actuaries' (1869, 20 Offices' Experience) method has been adopted in dealing with the ages and duration of the Policies. A portion of this investigation was commenced by Mr. R. P. Hardy (with the assistance of the writer) so far back as 1883, before much of the criticism to which that method had been subjected had appeared, and the work has naturally been continued on the same lines. But apart from this, the writer ventures to express his opinion that the original Institute method has the merit of simplicity, and is very suitable for old experience, where exact data, date of birth, death, &c., cannot be obtained. Given the Office age at entry (x) equivalent to the premium, the calendar year of entry and the calendar year and mode of exit, and your material is complete.

The life enters at age $(x-1)$. If he die or retire the following year, it is at age (x), and so on. Again, an important point in this investigation is that the method may more easily be understood by persons who are interested in the question but have no knowledge of actuarial technicalities.

(13.) The cards being completed they were sorted into firstly

- (*a*) Males and Females. Then each sex into
- (*b*) Abstainers and Non-Abstainers. Then
- (*c*) Whole-Life Policies; Endowment Assurances and others; and
- (*d*) Healthy and rated-up lives.

(14.) Of this material by far the largest and most important two divisions are those of Whole-Life Policies on Healthy Male Lives of Abstainers and Non-Abstainers respectively, and it is on their experience that our main conclusions must be based. The Female experience is, naturally, proportionately small. The experience of Endowment Assurances consists very largely of recent business, and of a large proportion of short term Policies, and as, moreover, the bulk of such business, if matured, passes out of observation at ages 55 and 60, the results based thereon cannot be accepted with any degree of confidence. However, the experience of these minor classes is given for what it is worth.

(15.) The cards of each final sub-division to be investigated were then sorted into entry ages (x) and the number at each entry age was entered in Column (2) at age $(x-1)$ on the following form:

Age (x)	Entered at Age (x)	PASSED FROM OBSERVATION AT AGE (x) AS					
		Transf'd.	Void	Surr'd.	Endow't. Matured	Died	Existing 31 Dec. 1901
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)

Sum of Columns (3) to (8)	Brought forward from Age $(x-1)$ $\left\{\begin{matrix}10+(2)\\-(9)\end{matrix}\right\}x-1$	$(2)+(3)+(5)+(6)$	$\frac{1}{2}(11)$	$\frac{5}{8}(4)$	Exposed to Risk $(2)+(10)-(12)-(13)$	Died (7)	Rate of Mortality $(15)\div(14)$	Age (x)
(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)

The same cards were then sorted into "Mode of Exit", *i.e.*, "Transfer", "Void", "Surrender", "Matured", "Death", or "Existing", and each mode of exit was sorted into exit ages. The number at each exit age $(x+n)$ was entered in its proper column against age $(x+n-1)$ and the numbers exposed to Risk at each age were obtained by the method indicated in the headings of the remaining columns of the form above.

(16.) The results put forward in the paper, except where otherwise stated, are based upon the entire experience of the Institution from 1841 to 1901 inclusive, a period of 61 years. It may be suggested that it would have been better to have taken the period 1863–1892, or the last 30 years' experience 1872–1901, as agreeing more closely with the O^M data. I venture to think, however, that the Institution's more extended experience is better. If the last 30 years only had been dealt with I believe the rates of mortality deduced therefrom would have been lighter than those based upon the total experience, because the new business would have formed a larger proportion of the whole. Later on is given the experience of the last 13 years' new business, showing a very low death rate. It is obvious that the smaller the proportion of old business combined with this, the lower would be the rate of mortality. But the most important point is that the same method and period be used for both sections.

(17.) The Total Experience of the Institution's working at various dates is also given later on.

(18.) The experience given throughout is that of "Policies" and not "Lives"; that is to say, every separate Policy on one life is regarded as a separate risk. The writer believes that the profession does not now insist on the superiority of the "Lives" method, some eminent authorities holding that if duplicate Policies issued simultaneously be eliminated, the "Policies" method is the preferable test. An experiment was made at an early stage of this investigation in reference to this question. In a large body of "Policies" the proper corrections for duplicates were made, and the results of each method "Policies" and "Lives" are given in Table IA. For practical purposes these results may be considered identical throughout the important periods of life; and bearing in mind the great labour involved in adjusting the cards for duplicate Policies, it was decided to adhere to the "Policy" method.

Table Ia.

Showing the results of dealing with "Policies" or "Lives" in a Mortality Investigation.

Ages	28,383 Policies			After eliminating Duplicates there remained 26,358 Lives			Ratio of (4) to (7) × 100	Ages
	Exposed to Risk	Died	Rate of Mortality per 100	Exposed to Risk	Died	Rate of Mortality per 100		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
–19	2,441	10	·410	2,331	10	·429	96·6	–19
20–24	8,306	60	·722	8,134	59	·725	99·6	20–24
25–29	23,384	153	·654	22,671	143	·631	104·	25–29
30–34	38,867	312	·803	36,984	298	·806	99·6	30–34
35–39	47,309	409	·865	44,270	383	·865	100·	35–39
40–44	47,471	509	1·072	44,146	472	1·069	100·	40–44
45–49	41,636	579	1·391	38,651	531	1·374	101·	45–49
50–54	32,126	569	1·771	29,835	514	1·723	103·	50–54
55–59	21,912	563	2·569	20,456	512	2·503	103·	55–59
60–64	13,200	448	3·394	12,305	416	3·381	100·	60–64
65–69	6,848	341	4·980	6,393	320	5·005	99·5	65–69
70–74	3,040	226	7·433	2,801	206	7·356	101·	70–74
75–79	1,027	120	11·688	933	112	12·000	97·4	75–79
80 & up.	253	56	22·140	224	50	22·330	99·2	80 & up.
All Ages	287,820	4,355	...	270,134	4,026	...	...	All Ages

THE COMBINED (ABSTAINERS AND NON-ABSTAINERS) EXPERIENCE.

(19.) Dealing first with the combined mortality of Abstainers and Non-Abstainers under Whole-Life Policies on Healthy Males we have the results exhibited in Table II. Col. 4 gives the actual annual Rate of Mortality per-cent, and Col. 6 gives the ratio of that rate (multiplied by 100) to the O^M standard. It will be seen that up to age 24 the experience has been unfavourable; but onwards to age 74 it has been well below the standard. For the group of ages 75–79 there is a noticeable increase—the rate just exceeding the standard; but beyond that age, with an experience of some 700 deaths, there is a decided recovery. This point should be kept in view in connection with the Abstainers' experience as shown later.

TABLE II.

Healthy Males. ABSTAINERS *and* NON-ABSTAINERS *combined.*
Whole-Life Policies. "*Transfers to*" *excluded.*

Entrants 1841–1901. *Experience* 1841–1901.

Ages	Exposed to Risk	Died	Rate of Mortality per-cent per annum unadjusted	Adjusted O^M rate of Mortality central ages of groups	Taking O^M as 100, the Institution's combined rate of Mortality is	Ages
(1)	(2)	(3)	(4)	(5)	(6)	(7)
– 9	151	1	·662	...	...	– 9
10–14	1,641	3	·183	·345	53·1	10–14
15–19	6,595	40	·607	·375	162·	15–19
20–24	25,276	136	·538	·431	125·	20–24
25–29	59,839	290	·485	·523	92·7	25–29
30–34	93,520	529	·566	·648	87·3	30–34
35–39	115,203	735	·636	·804	79·3	35–39
40–44	123,027	949	·772	1·001	77·1	40–44
45–49	117,308	1,231	1·050	1·277	82·2	45–49
50–54	103,079	1,455	1·411	1·693	83·4	50–54
55–59	82,853	1,721	2·077	2·338	88·9	55–59
60–64	60,424	1,796	2·972	3·344	88·9	60–64
65–69	39,698	1,878	4·730	4·900	96·5	65–69
70–74	22,182	1,500	6·762	7·281	92·9	70–74
75–79	10,131	1,119	11·050	10·882	102·	75–79
80–84	3,236	512	15·820	16·240	97·4	80–84
85–89	680	145	21·330	24·001	88·9	85–89
90–94	104	30	28·850	34·788	82·2	90–94
95–99	6	1	16·660	48·276	34·5	95–99
All Ages	864,953	14,071	...	...	...	All Ages

MORTALITY OF THE NON-ABSTAINERS.
(WHOLE-LIFE HEALTHY MALES.)

(20.) Coming now to the classification of the Institution's members into "Abstainers" and "Non-Abstainers" we shall deal first with the Mortality among the Non-Abstainers Healthy Males, Whole-Life Policies. There were 31,776 of these passing through 466,942 years of life. Of these 8,947 died. Their complete experience is shown in Table III and the summary thereof. It will be seen that the Mortality among the Non-Abstainers in the Institution during the younger ages (say to age 34) was in excess of the O^M, but for all the higher ages, and throughout the more important part of the Mortality Table, it shows a remarkable agreement with the O^M rate. Taking the Expected Deaths according to the O^M Table (obtained by multiplying the actual exposures by the O^M rate of Mortality—a method which, if not theoretically correct, will serve our purpose) we find the total from age 35 upwards to be 8,414, the

TABLE III.—*Summary*.

Healthy Males. NON-ABSTAINERS. *Entrants* 1841–1901.
Whole-Life Policies. "*Transfers to*" *excluded.* *Experience* 1841–1901.

Ages	Exposed to Risk	Died	Rate of Mortality per-cent per annum unadjusted	Adjusted O^M rate of Mortality % Central Ages of Groups	Expected Deaths by O^M	Taking O^M as 100, the Non-Abstainers' Experience is	Ages
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
– 9	74	...	...	...	...	...	– 9
10–14	590	1	·170	·345	2	49·3	10–14
15–19	2,104	10	·475	·375	8	127·	15–19
20–24	9,516	63	·662	·431	41	154·	20–24
25–29	27,099	157	·579	·523	142	111·	25–29
30–34	46,965	339	·722	·648	304	111·	30–34
35–39	61,106	495	·810	·804	491	101·	35–39
40–44	67,423	645	·957	1·001	675	95·6	40–44
45–49	65,931	846	1·283	1·277	842	100·	45–49
50–54	58,941	992	1·683	1·693	998	99·4	50–54
55–59	47,879	1,136	2·373	2·338	1,119	101·	55–59
60–64	35,161	1,148	3·265	3·344	1,176	97·6	60–64
65–69	23,219	1,176	5·065	4·900	1,138	103·	65–69
70–74	12,857	922	7·171	7·281	936	98·5	70–74
75–79	5,780	614	10·623	10·882	629	97·6	75–79
80–84	1,890	307	16·252	16·240	307	100·	80–84
85–89	358	79	22·607	24·001	86	94·2	85–89
90–94	49	16	32·653	34·788	17	93·9	90–94
95–99	1	1	100·000	48·276	...	207·	95–99
All Ages	466,943	8,947	...	...	8,911	...	All Ages

actual deaths being 8,377, a difference of less than one-half per-cent, while for some of the individual quinary groups of ages the numbers are identical. It will be fair, therefore, to assume the O^M as a standard representing the Mortality in the Institution of Healthy Males who are not Abstainers.

MORTALITY OF THE ABSTAINERS.

(WHOLE-LIFE HEALTHY MALES.)

(21.) We now arrive at the main subject of this paper, the Mortality of Abstainers. We have 29,094 Whole-Life Policies passing through 398,010 years of life. Of these 5,124 died. Their complete experience is shown in Table IV and the summary thereof. We see that for ages below 20 the mortality is considerably above the O^M standard, and for the quinary groups of ages 20–24 it is also distinctly higher than the O^M. But for ages 25 and onwards up to age 74 the results are much in favour of the Abstainers. This advantage increases up to the group of ages 40–44, when it is at its maximum, being under 55 per-cent of the O^M rate. After that age the rate very slowly approximates to the standard, being 71½ per-cent at ages 55–59 and 85 per-cent at the ages 70–74. For the group 75–79 the Abstainers' rate is in excess of the O^M, but for the remainder of life it is distinctly below. In general terms we may say that the feature of the Abstainers' Mortality is a great saving after early manhood throughout all the working years of life; which saving increases up to middle age, and gradually rises to the normal rate of healthy life as old age is reached at say ages 70 or 75.

For the group of ages 74–79 the rate, as already pointed out is well above the standard; and this peculiarity is exhibited, to a greater or less degree, in all classes of Policies, as will be shown hereafter. This would be consistent with a general deferment of Mortality consequent on a prolongation of the working years of life. The additional deaths that would have taken place between the ages of, say, 25 and 75, if the normal rate of Mortality had prevailed between those years, are postponed to appear after the latter age. And it is evident that in the five years immediately following that age, namely, during ages 75–79, an undue proportion of these lives have fallen in. But under normal conditions, *i.e.*, if the O^M rate had prevailed throughout, they would have died earlier. It will be seen that the expected deaths by the O^M Table at ages 75–79 were 474, the actual being 505. But if we take all ages over 74 to the end of life, the expected deaths were 792, the actual being 790.

(22.) In regard to the younger ages below 25, we have already seen in paragraph (20) that the experience of the Non-Abstainers has also been unfavourable. So far we have compared the Abstainers' experience with the O^M standard. Column (9) of

Table IV (summary) gives a comparison of the Abstainers' experience with that of the Non-Abstainers actually; and although for ages below 19 the Non-Abstainers show a superiority, yet for the group of

TABLE IV—*Summary.*

Healthy Males. ABSTAINERS. *Entrants* 1841–1901.
Whole-Life Policies. "*Transfers to*" *excluded.* *Experience* 1841–1901.

Ages	Exposed to Risk	Died	Rate of Mortality per-cent per annum Unadjusted	Adjusted O^M Rate of Mortality % Central Ages of Groups	Expected Deaths by O^M	Taking O^M as 100, the Abstainers' Experience is	Rate of Mortality per-cent per annum. Non-Abstainers' Experience Table III	Taking Non-Abstainers' Experience as 100, Abstainers' Experience is	Ages
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
– 9	77	1	1·299	...	...	...	...	...	– 9
10–14	1,051	2	·190	·345	4	55·1	·170	112·	10–14
15–19	4,491	30	·668	·375	17	177·	·475	141·	15–19
20–24	15,760	73	·463	·431	68	108·	·662	69·9	20–24
25–29	32,740	133	·406	·523	171	77·8	·579	70·1	25–29
30–34	46,555	190	·408	·648	302	62·9	·722	56·5	30–34
35–39	54,097	240	·444	·804	435	55·2	·810	54·8	35–39
40–44	55,604	304	·547	1·001	557	54·6	·957	57·2	40–44
45–49	51,377	385	·749	1·277	656	58·7	1·283	58·5	45–49
50–54	44,138	463	1·049	1·693	747	62·0	1·683	62·4	50–54
55–59	34,974	585	1·673	2·338	818	71·5	2·373	70·6	55–59
60–64	25,263	648	2·565	3·344	845	76·7	3·265	78·5	60–64
65–69	16,479	702	4·260	4·900	808	86·9	5·065	84·0	65–69
70–74	9,325	578	6·199	7·281	679	85·1	7·171	86·5	70–74
75–79	4,351	505	11·607	10·882	474	107·	10·623	110·	75–79
80–84	1,346	205	15·230	16·240	219	93·6	16·252	93·7	80–84
85–89	322	66	20·497	24·001	77	85·8	22·607	90·7	85–89
90–94	55	14	25·455	34·788	19	73·7	32·653	77·9	90–94
95–99	5	...	...	48·276	3	...	100·000	...	95–99
All Ages	398,010	5,124	...	...	6,899	...	...	...	All Ages

ages 20–24 the Abstainers have the advantage. Briefly, we may say that although the Abstainers' results below age 25 are inferior to

TABLE V.

Healthy Males. Excluding first five years of Assurance. *Entrants* 1841–1896.
Whole-Life Policies. "Transfers to" excluded. *Experience* 1846–1901.

Ages	ABSTAINERS			NON-ABSTAINERS			Taking Non-Abst'ners' as 100, Abst'ners' Experience is	Rate of Mortality per-cent per annum $O^{M(5)}$ Central Ages	TAKING $O^{M(5)}$ AS 100		Rate of Mortality per-cent per annum $H^{M(5)}$ Central Ages	TAKING $H^{M(5)}$ AS 100		Ages
	Exposed to Risk	Died	Rate of Mortality per-cent per annum	Exposed to Risk	Died	Rate of Mortality per-cent per annum			Abst'ners' Experience is	Non-Abst'ners' Experience is		Abst'ners' Experience is	Non-Abst'ners' Experience is	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(13)	(14)	(15)	(16)
– 9	1	...	...	...	...	...	...	...	...	...	...	...	...	– 9
10–14	79	...	...	55	...	...	...	·619	...	...	·302	...	...	10–14
15–19	936	6	·641	459	2	·436	147·4	·638	100·5	68·2	·440	145·7	99·1	15–19
20–24	3,496	16	·458	1,499	15	1·001	45·8	·665	68·9	150·5	1·028	44·6	97·4	20–24
25–29	12,138	66	·544	6,418	60	·935	58·2	·709	76·7	131·9	·994	54·7	94·1	25–29
30–34	25,756	118	·458	20,210	179	·886	51·7	·777	59·0	114·0	·926	49·5	95·7	30–34
35–39	37,153	178	·479	36,526	332	·909	52·7	·886	54·1	102·6	1·070	44·8	85·0	35–39
40–44	43,061	250	·581	48,679	507	1·042	55·8	1·056	55·0	98·7	1·158	50·2	90·0	40–44
45–49	42,734	335	·784	53,489	750	1·402	55·9	1·320	59·4	106·2	1·440	54·4	97·3	45–49
50–54	38,728	412	1·064	51,426	902	1·754	60·7	1·731	61·5	101·3	1·879	56·6	93·4	50–54
55–59	32,234	542	1·682	43,918	1,065	2·425	69·4	2·375	70·8	102·1	2·508	67·1	96·7	55–59
60–64	24,002	617	2·571	33,390	1,128	3·378	76·1	3·373	76·2	100·2	3·558	72·3	95·0	60–64
65–69	16,049	684	4·262	22,475	1,148	5·108	83·4	4·918	86·7	103·9	5·096	83·6	100·3	65–69
70–74	9,234	578	6·260	12,607	914	7·250	86·4	7·290	85·9	99·5	7·555	82·9	96·0	70–74
75–79	4,317	503	11·652	5,745	611	10·635	109·5	10·885	107·0	97·7	11·549	100·9	92·1	75–79
80–84	1,324	203	15·327	1,880	307	16·334	93·7	16·240	94·4	100·6	17·230	89·0	94·8	80–84
85–89	322	66	20·497	356	78	21·910	93·6	24·001	85·4	91·3	23·279	88·1	94·3	85–89
90–94	55	14	25·455	49	16	32·653	78·0	34·788	73·2	93·8	35·938	70·7	90·8	90–94
95–99	5	...	...	1	1	100·000	...	48·276	...	...	100·000	...	...	95–99
All Ages	291,624	4,588	...	339,182	8,015	...	...	...	...	...	...	...	...	All Ages

the O^M standard, they are, however, better than those of the Non-Abstainers. For the remaining years of life the ratios are much the same as in the O^M comparison.

(23.) In Table V we have the rates of Mortality, Abstainers

TABLE VI.

Healthy Males. Entrants previous to 1889. *Entrants* 1841–1888.
Whole-Life Policies. "Transfers to" excluded. Experience 1841–1901.

Ages	ABSTAINERS			NON-ABSTAINERS			Taking Non-Abstainers' as 100, Abstainers' Experience is	Rate of Mortality per-cent per annum O^M Central Ages	Rate of Mortality per-cent per annum $O^{M(5)}$ Central Ages	Ages
	Exposed to Risk	Died	Rate of Mortality per-cent per annum	Exposed to Risk	Died	Rate of Mortality per-cent per annum				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
– 9	76	1	1·311	73	...	...	...	...	...	– 9
10–14	874	2	·229	558	1	·180	127·70	·345	·619	10–14
15–19	3,442	28	·813	1,966	10	·508	159·90	·375	·638	15–19
20–24	12,278	68	·553	8,666	58	·669	82·66	·431	·665	20–24
25–29	27,007	114	·422	24,897	150	·602	70·06	·523	·709	25–29
30–34	40,112	179	·446	43,669	318	·728	61·29	·648	·777	30–34
35–39	48,352	220	·455	57,534	466	·810	56·17	·804	·886	35–39
40–44	50,818	292	·575	64,142	625	·975	58·97	1·001	1·056	40–44
45–49	47,684	365	·766	63,339	825	1·303	58·78	1·277	1·320	45–49
50–54	41,548	440	1·059	56,958	967	1·697	62·39	1·693	1·731	50–54
55–59	33,299	566	1·700	46,579	1,114	2·392	71·07	2·338	2·375	55–59
60–64	24,370	631	2·589	34,462	1,134	3·291	78·67	3·344	3·373	60–64
65–69	16,075	687	4·273	22,934	1,163	5·072	84·24	4·900	4·918	65–69
70–74	9,184	571	6·217	12,742	919	7·213	86·20	7·281	7·290	70–74
75–79	4,314	501	11·610	5,745	611	10·630	109·20	10·882	10·885	75–79
80–84	1,326	202	15·220	1,879	305	16·240	93·73	16·240	16·240	80–84
85–89	318	63	19·810	358	79	22·060	89·78	24·001	24·001	85–89
90–94	55	14	25·450	49	16	32·650	77·95	34·788	34·788	90–94
95–99	5	...	...	1	1	100·000	...	48·276	48·276	95–99
All Ages	361,137	4,944	...	446,551	8,762	...	...	...	...	All Ages

and Non-Abstainers, Whole-Life, Healthy Males, *excluding the first five years of assurance* from the experience; *i.e.*, corresponding to the $H^{M(5)}$ and $O^{M(5)}$ Tables. The Abstainers and Non-Abstainers

TABLE VII.

Healthy Males. Entrants previous to 1889. *Entrants* 1841–1888.
Whole-Life Policies. "Transfers to" excluded. *Experience* 1889–1901.

Ages	ABSTAINERS			NON-ABSTAINERS			Taking Non-Abstainers' as 100, Abstainers' Experience is	Rate of Mortality per-cent per annum O^{M} Central Ages	Rate of Mortality per-cent. per annum $O^{M(5)}$ Central Ages	Ages
	Exposed to Risk	Died	Rate of Mortality per-cent per annum	Exposed to Risk	Died	Rate of Mortality per-cent per annum				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
– 9	...	...	...	...	...	...	...	...	...	– 9
10–14	30	...	...	18	...	...	...	·345	·619	10–14
15–19	268	2	·746	71	...	...	...	·375	·638	15–19
20–24	1,090	4	·367	235	...	...	...	·431	·665	20–24
25–29	3,465	9	·260	1,058	12	1·134	22·93	·523	·709	25–29
30–34	7,674	30	·391	3,318	25	·753	51·92	·648	·777	30–34
35–39	12,738	45	·353	6,958	60	·862	40·97	·804	·886	35–39
40–44	16,070	90	·560	11,302	88	·778	71·98	1·001	1·056	40–44
45–49	17,101	118	·690	15,297	196	1·281	53·88	1·277	1·320	45–49
50–54	16,580	179	1·080	17,350	295	1·700	63·52	1·693	1·731	50–54
55–59	14,692	257	1·749	17,764	397	2·235	78·27	2·338	2·375	55–59
60–64	11,645	274	2·352	15,833	509	3·215	73·16	3·344	3·373	60–64
65–69	8,618	357	4·143	12,312	618	5·020	82·53	4·900	4·918	65–69
70–74	5,695	324	5·689	7,881	559	7·093	80·20	7·281	7·290	70–74
75–79	2,992	358	11·960	3,953	408	10·321	115·90	10·882	10·885	75–79
80–84	962	144	14·980	1,409	233	16·539	90·57	16·240	16·240	80–84
85–89	235	47	20·000	294	60	20·408	98·20	24·001	24·001	85–89
90–94	39	9	23·070	47	15	31·915	72·28	34·788	34·788	90–94
95–99	5	...	...	1	1	100·000	...	48·276	48·276	95–99
All Ages	119,899	2,247	...	115,101	3,476	...	...	...	...	All Ages

are compared with one another, and each with the two standard Tables. The Abstainers here show as marked a superiority as in the complete experience.

TABLE VIII.

Healthy Males. *Entrants* 1889–1901. *Entrants* 1889–1901.
Whole-Life Policies. "*Transfers to*" *excluded.* *Experience* 1889–1901.

Ages	Abstainers			Non-Abstainers			Taking Non-Abstainers' as 100 Abstainers' Experience is	Ages
	Exposed to Risk	Died	Rate of Mortality per-cent per annum	Exposed to Risk	Died	Rate of Mortality per-cent per annum		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
– 9	1	...	...	1	...	...	...	– 9
10–14	176	...	...	32	...	...	...	10–14
15–19	1,050	2	·191	138	...	...	...	15–19
20–24	3,481	5	·144	850	5	·589	24·40	20–24
25–29	5,733	19	·331	2,201	7	·318	104·09	25–29
30–34	6,443	11	·171	3,296	21	·637	26·80	30–34
35–39	5,746	20	·348	3,572	29	·812	42·86	35–39
40–44	4,787	12	·251	3,281	20	·609	41·22	40–44
45–49	3,693	20	·542	2,592	21	·810	66·83	45–49
50–54	2,590	23	·888	1,983	25	1·260	70·47	50–54
55–59	1,675	19	1·134	1,301	22	1·691	67·10	55–59
60–64	893	17	1·903	698	14	2·004	94·97	60–64
65–69	404	15	3·713	286	13	4·553	81·55	65–69
70–74	140	7	5·000	115	3	2·609	192·50	70–74
75–79	37	4	10·810	35	3	8·570	126·20	75–79
80–84	20	3	15·000	11	2	18·182	84·65	80–84
85–89	4	3	75·000	...	...	...	...	85–89
90–94	...	...	...	...	...	...	...	90–94
95–99	...	...	...	...	...	...	...	95–99
All Ages	36,873	180	...	20,392	185	...	...	All Ages

In Table VI are the rates of Mortality during the complete period 1841–1901 of the Healthy Male Assurers *who entered before* 1889, *i.e.*, excluding the new business of the last 13 years

TABLE IX.

Rated-up Males. True Ages. *Entrants* 1841–1901.
Whole-Life Policies. "Transfers to" excluded. *Experience* 1841–1901.

Ages	ABSTAINERS			NON-ABSTAINERS			Taking Non-Abstainers' as 100 Abstainers' Experience is	Ages
	Exposed to Risk	Died	Rate of Mortality per-cent per annum	Exposed to Risk	Died	Rate of Mortality per-cent per annum		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
– 9	17	...	...	2	...	...	...	– 9
10–14	44	1	2·268	15	...	...	...	10–14
15–19	262	...	...	116	1	·862	...	15–19
20–24	1,712	13	·760	1,008	7	·695	109·30	20–24
25–29	4,448	20	·450	3,443	32	·929	48·44	25–29
30–34	6,442	36	·559	6,136	57	·929	60·17	30–34
35–39	7,316	32	·437	7,745	88	1·136	38·47	35–39
40–44	7,318	40	·547	8,409	97	1·154	47·40	40–44
45–49	6,563	64	·975	8,153	152	1·864	52·31	45–49
50–54	5,253	72	1·371	7,079	133	1·879	72·96	50–54
55–59	3,871	74	1·912	5,594	145	2·592	73·77	55–59
60–64	2,585	90	3·481	3,964	149	3·759	92·60	60–64
65–69	1,587	55	3·466	2,427	110	4·531	76·49	65–69
70–74	890	73	8·198	1,390	129	9·282	88·33	70–74
75–79	379	51	13·456	579	62	10·717	125·56	75–79
80–84	123	17	13·821	201	31	15·423	89·62	80–84
85–89	43	5	11·628	53	12	22·641	51·36	85–89
90–94	6	5	83·334	7	2	28·571	291·67	90–94
95–99	...	...	...	...	...	...	...	95–99
All Ages	48,859	648	...	56,321	1,207	...	...	All Ages

1889–1901. The O^{M} and $\text{O}^{\text{M(5)}}$ rates are shown for convenience, but they do not admit of a direct comparison. The ratios of the Abstainers to the Non-Abstainers are given in Column (8).

TABLE X.

Rated-up Males. Rated-up Ages. *Entrants* 1841–1901.

Whole-Life Polices. "Transfers to" excluded. *Experience* 1841–1901.

Ages	ABSTAINERS			NON-ABSTAINERS			Taking Non-Abstainers' as 100, Abstainers' Experience is	Rate of Mortality per-cent per annum O^{M} Central Ages	TAKING O^{M} AS 100		Ages
	Exposed to Risk	Died	Rate of Mortality per-cent per annum	Exposed to Risk	Died	Rate of Mortality per-cent per annum			Abstainers' Experience is	Non-Abstainers' Experience is	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
– 9	5	...	...	...	...	...	...	...	...	...	– 9
10–14	24	...	...	8	...	...	...	·345	...	...	10–14
15–19	50	1	2·000	17	...	...	...	·375	532·40	...	15–19
20–24	247	1	·405	165	1	·608	66·62	·431	93·97	141·00	20–24
25–29	1,329	9	·677	1,087	11	1·012	66·90	·523	129·40	193·50	25–29
30–34	3,964	16	·404	3,330	29	·870	46·44	·648	62·34	134·20	30–34
35–39	6,218	27	·434	5,945	55	·925	46·92	·804	53·98	115·00	35–39
40–44	7,525	46	·611	7,936	104	1·311	46·60	1·001	61·04	131·00	40–44
45–49	7,848	43	·548	8,775	93	1·060	51·70	1·277	42·91	83·00	45–49
50–54	7,077	74	1·046	8,629	152	1·762	59·36	1·693	61·77	104·10	50–54
55–59	5,561	75	1·349	7,230	151	2·089	64·58	2·338	57·70	89·35	55–59
60–64	4,011	77	1·920	5,622	144	2·562	74·94	3·344	57·41	76·61	60–64
65–69	2,561	94	3·670	3,857	155	4·019	91·33	4·900	74·90	82·02	65–69
70–74	1,475	70	4·745	2,245	150	6·683	70·99	7·281	65·16	91·79	70–74
75–79	650	70	10·778	1,002	94	9·381	114·90	10·882	99·08	86·22	75–79
80–84	228	30	13·187	353	45	12·766	103·30	16·240	81·21	78·63	80–84
85–89	69	8	11·594	102	17	16·586	69·87	24·001	48·29	69·12	85–89
90–94	17	7	41·177	18	6	33·333	123·60	34·788	118·40	95·79	90–94
95–99	...	...	...	...	...	...	...	48·276	...	...	95–99
All Ages	48,859	648	...	56,321	1,207	...	...	...	...	...	All Ages

Table VII shows the experience of the same body during the years 1889–1901 only, *i.e., after the exclusion of new business.*

Table VIII gives the experience of *new entrants only* during the years 1889–1901.

Tables V, VI, VII and VIII are "Select" experience of Whole-Life Policies on Healthy Males, and are each parts of the general experience given in Tables III and IV. In each of these divisions the superior vitality of the Abstainers is conspicuous.

RATED-UP LIVES.

(24.) Table IX gives the experience of "Rated-up" Lives Whole-Life Policies at their true ages.

Table X of the same lives at the ages corresponding to the ratings.

These are, of course, a separate body of persons from those in the preceding Tables; but the superiority of the Abstainer is still evident in both Tables.

ENDOWMENT ASSURANCES.

(25.) Table XI gives the rates of Mortality under Endowment Assurances Healthy Males over the entire period 1841–1901. Here, again, the Abstainers show the best results.

FEMALES.

(26.) Table XII, Whole-Life Policies, Healthy Females: The H^F Table being taken as a standard. The difference between the Abstainers and Non-Abstainers is not so marked as among the Males. The Abstainers are generally as much superior to the Standard H^F as are the Male Abstainers to the O^M, but the Female Non-Abstainers are also superior to the Standard, though to a less extent than the Abstainers. It is not unreasonable to assume that the Female Non-Abstainer of the assuring class is more temperate and careful in her habits, *i.e.,* more closely approaches the Abstainer, than does the corresponding Male, and this, I suggest, as the reason of her greater comparative vitality.

(27.) Table XIII shows in a form convenient for comparison the ratios (multiplied by 100) of the Abstainers' rate of Mortality to that of the Non-Abstainers in the various classes given in Tables IV, V, VI, VIII, IX, X, XI, and XII. It may be read thus in any class, taking Column (2) as an example. Of 100 persons, Non-Abstainers, dying, of the ages 50–54, according to the experience only 62 would die among a similar body of Abstainers.

TABLE XI.

Healthy Males. Endowment Assurances.
“ *Transfers to* ” *excluded.*

Entrants 1841–1901.
Experience 1841–1901.

Ages	ABSTAINERS.			NON-ABSTAINERS.			Taking Non-Abstainers' as 100, Abstainers' Experience is	Ages
	Exposed to Risk	Died	Rate of Mortality per-cent per annum	Exposed to Risk	Died	Rate of Mortality per-cent per annum		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
– 9	48	...	...	31	...	...	...	– 9
10–14	1,052	1	·095	266	1	·377	25·20	10–14
15–19	5,368	15	·279	1,466	3	·205	136·10	15–19
20–24	21,539	70	·325	8,894	36	·405	80·24	20–24
25–29	37,243	159	·427	21,329	97	·455	93·84	25–29
30–34	40,858	165	·404	29,037	124	·427	94·62	30–34
35–39	36,960	155	·419	29,858	191	·640	65·46	35–39
40–44	29,606	164	·554	25,963	190	·732	75·68	40–44
45–49	21,287	139	·653	19,585	186	·950	68·74	45–49
50–54	12,870	127	·987	12,145	152	1·252	78·83	50–54
55–59	7,018	112	1·596	6,753	121	1·792	89·06	55–59
60–64	2,063	66	3·199	1,762	50	2·838	112·70	60–64
65–69	122	4	3·265	94	2	2·128	153·40	65–69
70–	5	...	...	9	...	...	...	70–
All Ages	216,039	1,177	...	157,192	1,153	...	...	All Ages

TABLE XII.

Healthy Females. Whole-Life Policies. *Entrants* 1841–1901.
" *Transfers to* " *excluded.* *Experience* 1841–1901.

Ages	ABSTAINERS			NON-ABSTAINERS			Taking Non-Abstainers' as 100, Abstainers' Experience is	Rate of Mortality per-cent per annum H^F Central Ages	TAKING H^F AS 100		Ages
	Exposed to Risk	Died	Rate of Mortality per-cent per annum	Exposed to Risk	Died	Rate of Mortality per-cent per annnm			Abstainers' Experience is	Non-Abstainers' Experience is	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
– 9	75	...	...	54	1	1·869	...	...	...	...	– 9
10–14	344	5	1·456	228	...	...	...	·514	283·27	...	10–14
15–19	697	2	·287	500	2	·400	71·75	·707	40·60	56·58	15–19
20–24	1,135	8	·705	1,203	8	·665	106·00	·792	89·02	83·97	20–24
25–29	1,897	13	·685	2,904	28	·964	71·06	1·182	57·96	81·56	25–29
30–34	2,707	27	·997	4,933	36	·730	136·60	1·157	86·18	63·10	30–34
35–39	3,454	31	·897	6,756	69	1·021	87·86	1·204	74·51	84·80	35–39
40–44	3,927	33	·843	7,983	77	·965	87·36	1·294	65·15	74·58	40–44
45–49	4,212	47	1·116	8,657	111	1·282	87·06	1·388	80·41	92·36	45–49
50–54	4,164	51	1·225	8,588	120	1·397	87·68	1·562	78·42	89·43	50–54
55–59	3,719	64	1·721	7,971	148	1·857	92·68	1·989	86·58	93·41	55–59
60–64	3,139	83	2·644	6,699	208	3·105	85·15	2·846	92·92	109·10	60–64
65–69	2,280	94	4·122	5,065	225	4·442	92·77	4·340	94·95	102·40	65–69
70–74	1,412	109	7·720	3,239	222	6·854	112·60	6·917	111·60	99·08	70–74
75–79	629	72	11·449	1,607	166	10·328	110·80	10·976	104·30	94·08	75–79
80–84	183	35	19·126	534	101	18·917	101·10	13·170	145·20	143·60	80–84
85–89	36	10	27·778	105	21	20·000	138·90	23·696	117·20	84·39	85–89
90–94	3	2	66·667	27	6	22·222	300·00	23·200	287·30	95·76	90–94
95–99	...	...	...	3	2	66·667	...	33·775	...	197·30	95–99
All Ages	34,013	686	...	67,056	1,551	...	...	...	...	...	All Ages

TABLE XIII.

Summary of the Ratios of Mortality Rates of Abstainers (per-cent per annum) to those of Non-Abstainers.

Ages	TAKING NON-ABSTAINERS AS 100, THE ABSTAINERS' RATES UNDER THE VARIOUS GROUPS ARE								Ages
	Males				Females Whole-Life	Males (Whole-Life)			
	Whole Life	Endowment Assurance	Rated-up Lives			Excluding 1st Five Years of Assurance	Entrants 1841-1888 during 1841-1901	New Entrants 1889-1901 only	
			True Ages	Rated-up Ages					
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
– 9	...	...	...	...	...	...	...	...	– 9
10–14	112·0	25·2	...	...	...	...	128·	...	10–14
15–19	141·0	136·	...	...	71·8	147·	160·	...	15–19
20–24	69·9	80·2	109·	66·6	106·	45·8	82·7	24·4	20–24
25–29	70·1	93·8	48·4	66·9	71·1	58·2	70·1	104·	25–29
30–34	56·5	94·6	60·2	46·4	137·	51·7	61·3	26·8	30–34
35–39	54·8	65·5	38·5	46·9	87·9	52·7	56·2	42·9	35–39
40–44	57·2	75·7	47·4	46·6	87·4	55·8	59·0	41·2	40–44
45–49	58·5	68·7	52·3	51·7	87·1	55·9	58·8	66·8	45–49
50–54	62·4	78·8	73·0	59·4	87·7	60·7	62·4	70·5	50–54
55–59	70·6	89·1	73·8	64·6	92·7	69·4	71·1	67·1	55–59
60–64	78·5	113·	92·6	74·9	85·2	76·1	78·7	95·0	60–64
65–69	84·0	153·	76·5	91·3	92·8	83·4	84·2	81·6	65–69
70–74	86·5	...	88·3	71·0	113·	86·4	86·2	193·	70–74
75–79	110·0	...	126·	115·	111·	110·	109·	126·	75–79
80–84	93·7	...	89·6	103·	101·	93·7	93·7	84·7	80–84
85–89	90·7	...	51·4	69·9	139·	93·6	89·8	...	85–89
90–94	77·9	...	292·	124·	300·	78·0	78·0	...	90–94
95–99	...	...	...	...	...	...	...	...	95–99

(28.) It will be noticed how closely the ratios resemble one another in their general results. The curious temporary increase in the Abstainers' rate, as compared with the standard in the group of ages 74–79, and the recovery at the later ages is clearly shown in every class of Policy.

TABLE XIV.

Healthy Males. Whole-Life Policies. Rates of Mortality in various periods compared with 1841–1901.

Ages	ABSTAINERS. RATES OF MORTALITY PER-CENT PER ANNUM					NON-ABSTAINERS. RATES OF MORTALITY PER-CENT PER ANNUM					Ages
	1841—82 42 Years	1841—88 48 Years	1841—1901 61 Years	Taking 1841—1901 as 100		1841—82 42 Years	1841—88 48 Years	1841—1901 61 Years	Taking 1841—1901 as 100,		
				1841—82	1841—88				1841—82	1841—88	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
– 9	1·167	1·320	1·299	89·6	101·	...	...	...	...	...	– 9
10–14	·282	·237	·190	148·	125·	·197	·185	·170	116·	109·	10–14
15–19	·849	·820	·668	127·	123·	·474	·529	·475	99·8	111·	15–19
20–24	·668	·571	·463	144·	123·	·747	·688	·662	113·	104·	20–24
25–29	·500	·447	·406	123·	110·	·663	·580	·579	115·	100·	25–29
30–34	·475	·460	·408	116·	113·	·799	·726	·722	111·	101·	30–34
35–39	·498	·492	·444	112·	111·	·858	·802	·810	106·	99·	35–39
40–44	·635	·582	·547	116·	106·	1·082	1·016	·957	113·	106·	40–44
45–49	·904	·807	·749	121·	108·	1·409	1·309	1·283	110·	102·	45–49
50–54	1·077	1·045	1·049	103·	99·6	1·752	1·696	1·683	104·	101·	50–54
55–59	1·680	1·661	1·673	100·	99·3	2·581	2·488	2·373	109·	105·	55–59
60–64	2·814	2·806	2·565	110·	109·	3·436	3·355	3·265	105·	103·	60–64
65–69	4·121	4·425	4·260	96·7	104·	5·019	5·131	5·065	99·2	101·	65–69
70–74	6·363	7·079	6·199	103·	114·	7·418	7·406	7·171	103·	103·	70–74
75–79	10·178	10·823	11·607	87·7	93·2	11·485	11·331	10·623	108·	107·	75–79
80–84	14·634	15·891	15·230	96·1	104·	19·512	15·335	16·252	120·	94·4	80–84
85–89	18·557	19·277	20·497	90·5	94·	47·826	29·687	22·607	212·	131·	85–89
90–94	38·462	31·250	25·455	151·	123·	...	50·000	32·653	...	153·	90–94
95–99	...	...	...	...	...	...	...	100·000	...	...	95–99

The main results of the principal divisions, namely :

Healthy Males—Whole-Life Policies,
Do. Endowment Assurances,
Rated-up Males,
Healthy Females,

as compared with the Non-Abstainers' standard of each division, are exhibited in pictorial form in Diagram 1. It will be seen that 40 degrees of the ordinates have been omitted to save space. The curves indicated by the several lines all take the same form. Approaching, and sometimes exceeding, the standard of the Non-Abstainers at the younger ages, they show a very great superiority throughout middle life, and approximate to the standard again in old age. It should be noted that the curves cannot be compared with one another.

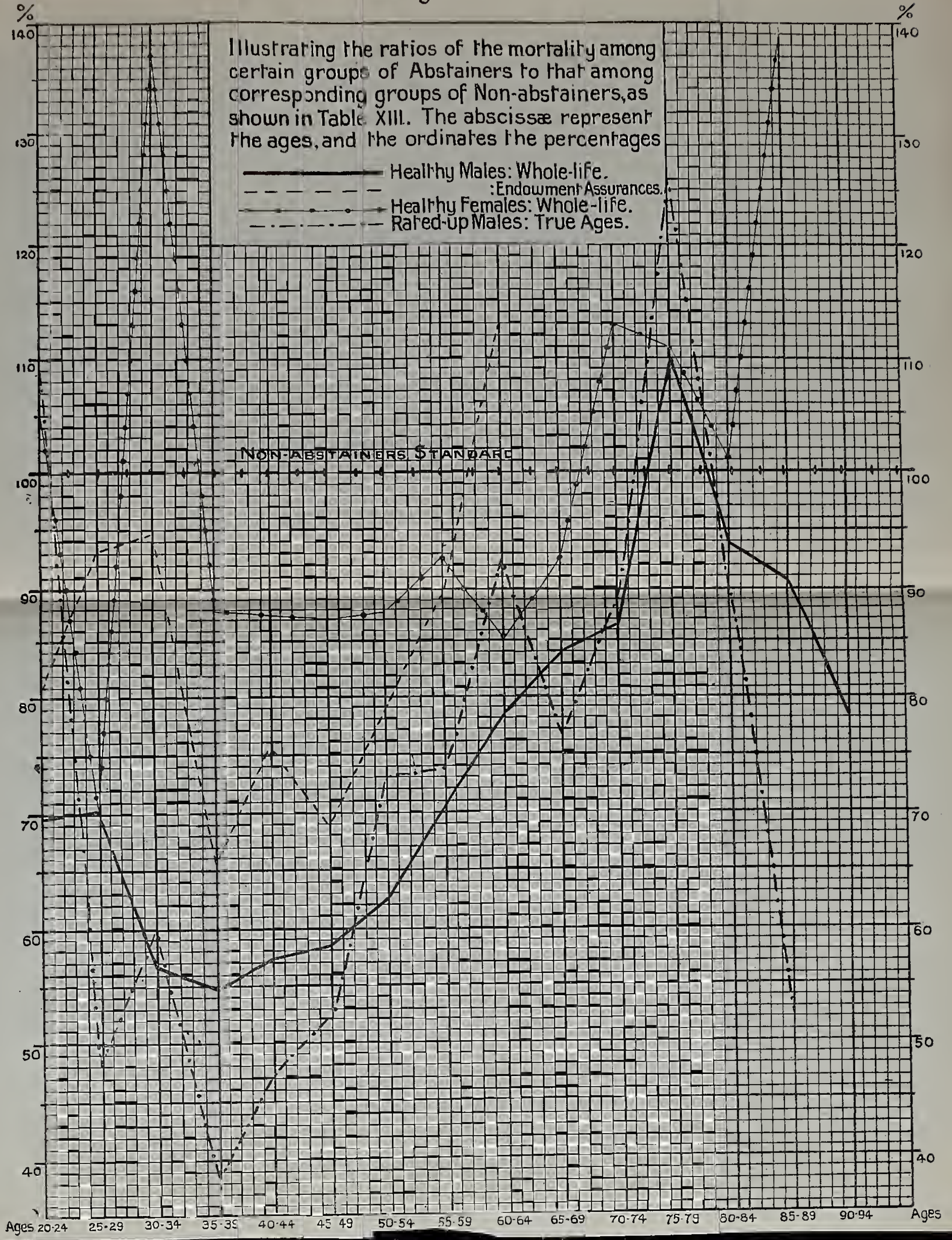
(29.) Table XIV gives the rates of Mortality of Healthy Males, Whole-Life Policies, from 1841 to the close of the years 1882 and 1888, in both the Abstainers' and Non-Abstainers' Sections respectively, and compares these rates with those of the full period 1841-1901. The general improvement in both sections is very obvious, thus confirming my belief, expressed in paragraph 16, that, had a more recent section of the Institution's history been dealt with, the results deduced would have been even more favourable than those now shown.

ON THE EFFECT OF TRANSFERS BETWEEN THE ABSTAINERS' AND NON-ABSTAINERS' SECTIONS.

(30.) In Tables III and IV only original entrants are included, as stated in the headings thereof. "Transfers to" either section are excluded altogether, and "Transfers from" are treated as having passed from observation at the time of transfer.

It has been suggested by persons not conversant with the working of the Institution that a large proportion of the lives transferred from the Abstainers' to the Non-Abstainers' Section may be in poor health or of doubtful habits; and that the Mortality of the Abstainers' Section is thus lightened, and that of the Non-Abstainers' Section correspondingly increased by such transfers. In other words, it is supposed that when an Abstainer's health deteriorates, if he take alcohol he is transferred to the Non-Abstainers' Section to die, and his death is included in the latter section. Now (A) an Abstainer is allowed to take alcohol temporarily as a medicine *bona fide*, and (B) he is not transferred if he be known to be in bad health or of intemperate habits. (In the latter case (B) a record is made in the Institution's

Diagram I.



Illustrating the ratios of the mortality among certain groups of Abstainers to that among corresponding groups of Non-abstainers, as shown in Table XIII. The abscissæ represent the ages, and the ordinates the percentages

Registers that he is to receive Non-Abstainer's rate of Bonus only.) But apart from these facts the transfers have been so few that their effect can be but insignificant. Table XV shows the numbers transferred year by year between the two sections under Whole-Life Policies, and also the number of such Policies in force at certain dates. The increase in the transfers from the Temperance to the General Section in the years 1900

TABLE XV.—*Showing the Number of Transfers between Abstainers' and Non-Abstainers' Sections in each Year. Whole-Life Policies.*

Year	TRANSFERS	
	To Non-Abstainers	To Abstainers
(1)	(2)	(3)
1847	2	...
1848	5	...
1849	2	...
1850	6	...
1851	8	1
1852	19	1
1853	11	1
1854	11	3
1855	14	...
1856	11	8
1857	23	10
1858	13	8
1859	31	17
1860	32	10
1861	28	22
1862	35	23
1863	33	...
1864	42	24
1865	49	26
1866	44	18
1867	31	7
1868	29	15
1869	28	10
1870	57	24
1871	35	40
1872	36	34
1873	26	30
1874	31	25
1875	68	44
1876	32	35
1877	33	45
1878	19	32
1879	21	47
1880	78	67
1881	26	65
1882	19	84
1883	34	85
1884	28	60
1885	60	98
1886	28	41
1887	32	29
1888	33	33
1889	29	24
1890	94	46
1891	33	41
1892	37	21
1893	25	26
1894	31	22
1895	73	40
1896	42	20
1897	34	4
1898	32	22
1899	29	16
1900	841	47
1901	182	14
Total	2,685	1,465

Corresponding Policies in force—

	Abstainers	Non-Abstainers
31 December 1882	9,808	12,233
31 December 1888	11,245	11,338
31 December 1901	12,645	9,382

TABLE XVI—*Summary.*

Healthy Males. Whole-Life Policies. *Transfers* 1847–1901.
Showing effect of TRANSFERS TO NON-ABSTAINERS. *Experience* 1847–1901.

Ages	TRANSFERS TO NON-ABSTAINERS			TRANSFERS TO NON-ABSTAINERS COMBINED WITH NON-ABSTAINERS			TRANSFERS TO NON-ABSTAINERS COMBINED WITH ABSTAINERS			Ages
	Exposed to Risk	Died	Rate of Mortality per-cent per annum	Exposed to Risk	Died	Rate of Mortality per-cent per annum	Exposed to Risk	Died	Rate of Mortality per-cent per annum	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
– 9	...	...	...	74	...	...	77	1	1·299	– 9
10–14	5	...	...	595	1	·168	1,056	2	·189	10–14
15–19	37	...	...	2,141	10	·467	4,528	30	·663	15–19
20–24	332	4	1,205	9,848	67	·680	16,092	77	·479	20–24
25–29	1,179	6	·509	28,278	163	·576	33,919	139	·410	25–29
30–34	2,431	16	·658	49,396	355	·719	48,986	206	·421	30–34
35–39	3,296	31	·941	64,402	526	·817	57,393	271	·472	35–39
40–44	3,579	38	1·062	71,002	683	·962	59,183	342	·578	40–44
45–49	3,482	57	1·637	69,413	903	1·301	54,859	442	·806	45–49
50–54	3,050	46	1·508	61,991	1,038	1·674	47,188	509	1·079	50–54
55–59	2,566	86	3·352	50,445	1,222	2·423	37,540	671	1·787	55–59
60–64	1,879	59	3·141	37,040	1,207	3·259	27,142	707	2·605	60–64
65–69	1,182	80	6·771	24,401	1,256	5·147	17,661	782	4·428	65–69
70–74	627	47	7·496	13,484	969	7·186	9,952	625	6·280	70–74
75–79	271	23	8·487	6,051	637	10·527	4,622	528	11·424	75–79
80–84	87	21	24·138	1,977	328	16·599	1,433	226	15·771	80–84
85–89	16	2	12·500	374	81	21·658	338	68	20·116	85–89
90–94	4	1	25·000	53	17	32·075	59	15	25·423	90–94
95–99	...	...	...	1	1	100·000	5	...	...	95–99
All Ages	24,023	517	...	490,966	9,464	...	422,033	5,641	...	All Ages

TABLE XVII—*Summary.*

Healthy Males. Whole-Life Policies. *Transfers* 1851–1901.
Showing effect of TRANSFERS TO ABSTAINERS. *Experience* 1851–1901.

Ages	TRANSFERS TO ABSTAINERS			TRANSFERS TO ABSTAINERS COMBINED WITH ABSTAINERS			TRANSFERS TO ABSTAINERS COMBINED WITH NON-ABSTAINERS			Ages
	Exposed to Risk	Died	Rate of Mortality per-cent per annum	Exposed to Risk	Died	Rate of Mortality per-cent per annum	Exposed to Risk	Died	Rate of Mortality per-cent per annum	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
– 9	...	...	...	77	1	1·299	74	...	...	– 9
10–14	2	...	...	1,053	2	·190	592	1	·169	10–14
15–19	22	...	...	4,513	30	·665	2,126	10	·470	15–19
20–24	123	1	·813	15,883	74	·466	9,639	64	·664	20–24
25–29	433	3	·694	33,173	136	·410	27,532	160	·581	25–29
30–34	951	2	·210	47,506	192	·404	47,916	341	·712	30–34
35–39	1,597	5	·313	55,694	245	·440	62,703	500	·797	35–39
40–44	2,363	10	·423	57,967	314	·542	69,786	655	·939	40–44
45–49	2,849	27	·948	54,226	412	·760	68,780	873	1·269	45–49
50–54	3,118	29	·930	47,256	492	1·041	62,059	1,021	1·645	50–54
55–59	2,971	47	1·582	37,945	632	1·666	50,850	1,183	2·326	55–59
60–64	2,504	65	2·596	27,767	713	2·568	37,665	1,213	3·220	60–64
65–69	1,707	74	4·334	18,186	776	4·267	24,926	1,250	5·015	65–69
70–74	914	56	6·130	10,239	634	6·193	13,771	978	7·102	70–74
75–79	470	42	8·936	4,821	547	11·347	6,250	656	10·476	75–79
80–84	154	21	13·592	1,500	226	15·062	2,044	328	16·050	80–84
85–89	23	3	13·333	345	69	20·029	381	82	21·550	85–89
90–94	2	2	100·000	57	16	28·070	51	18	35·294	90–94
95–99	...	...	...	5	...	...	1	1	100·000	95–99
All Ages	20,203	387	...	418,213	5,511	...	487,146	9,334	...	All Ages

and 1901, was due to the issue of more definite and detailed instructions on some points on which it was found there had been some doubt and variation in practice in different districts. It is practically certain that many of those who declined to sign the declaration were really Abstainers, and they may apply for re-transfer later on. Be this as it may, it is obvious that the operations of these particular years, 1900 and 1901, cannot have any material effect on the aggregate experience 1841–1901.

A second set of cards was prepared for these transferred cases on which the year of entry and age at entry were respectively the year of transfer and the corresponding age. They were then dealt with independently in their new section in the form given in par. 15. The full statistics relating to them are given in Tables XVI and XVII. It will be seen that the number of entrants in Tables XVI and XVII differs from the exits by transfer in Tables IV and III the reason being that some of the former are re-transfers and a few of the latter are transfers to a different class of Policy; for example, from Whole-Life to Endowment Assurance.

(31.) In Table XVIII are shown, in respect of lives transferred from the Abstainers' to the Non-Abstainers' Section, the following rates of Mortality,

(*a*) Among the transferred cases only.

(*b*) Combining these cases with the section to which they are transferred. In practice they are so combined.

(*c*) Combining the same cases with their original section; *i.e.*, treating them as if they had not been transferred at all.

Table XIX gives similar information in regard to transfers from the Non-Abstainers' to the Abstainers' Section.

(32.) Now what has been the effect of these transfers on the Non-Abstainers' Mortality? If we refer to Columns 2 and 6 of Table XVIII we see that the general rate of Mortality of these transferred lives has exceeded what may be termed the normal rate of Mortality of the Non-Abstainers. But on referring to Columns 3 and 7 of the same Table, we see that when the exposures and deaths of the transfers are combined with those of the general body of Non-Abstainers, the numbers of the former being small, no appreciable effect is made on the latter. This combination is what actually takes place in practice, and it is important that its operation should be fully understood.

(33.) I venture to state that the ratios in Column 7 of Table XVIII are a *complete refutation of the suggestion that the*

TABLE XVIII.

Healthy Males. Whole-Life Policies. *Experience* 1847–1901.

Rates of Mortality of TRANSFERS TO NON-ABSTAINERS.

Ages	RATES OF MORTALITY PER-CENT PER ANNUM				TAKING NORMAL RATE AS 100			Ages
	Transfers to Non-Abstainers alone	Transfers to Non-Abstainers combined with Non-Abstainers	Transfers to Abstainers combined with Non-Abstainers	Normal rate of Non-Abstainers without transfers	Transfers to Non-Abstainers alone are	Transfers to Non-Abstainers combined with Non-Abstainers	Transfers to Abstainers combined with Non-Abstainers	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
10–14	...	·168	·169	·170	...	98·83	99·43	10–14
15–19	...	·467	·470	·475	...	98·31	98·72	15–19
20–24	1·205	·680	·664	·662	182·00	102·70	100·30	20–24
25–29	·509	·576	·581	·579	87·90	99·47	100·30	25–29
30–34	·658	·719	·712	·722	91·14	99·59	98·63	30–34
35–39	·941	·817	·797	·810	116·20	100·90	98·40	35–39
40–44	1·062	·962	·939	·957	111·00	100·50	98·13	40–44
45–49	1·637	1·301	1·269	1·283	127·60	101·40	98·92	45–49
50–54	1·508	1·674	1·645	1·683	89·60	99·47	97·72	50–54
55–59	3·352	2·423	2·326	2·373	141·50	102·10	98·03	55–59
60–64	3·141	3·259	3·220	3·265	96·21	99·82	98·63	60–64
65–69	6·771	5·147	5·015	5·065	133·70	101·60	99·01	65–69
70–74	7·496	7·186	7·102	7·171	104·50	100·20	99·04	70–74
75–79	8·487	10·527	10·476	10·623	79·93	98·92	98·70	75–79
80–84	24·138	16·599	16·050	16·252	148·50	102·10	98·76	80–84
85–89	12·500	21·658	21·550	22·607	55·28	95·81	95·30	85–89
90–94	25·000	32·075	35·294	32·653	76·56	98·24	108·10	90–94

TABLE XIX.

Healthy Males. Whole-Life Policies. *Experience* 1851–1901.

Rates of Mortality of TRANSFERS TO ABSTAINERS.

Ages	RATES OF MORTALITY PER-CENT PER ANNUM				TAKING NORMAL RATE AS 100			Ages
	Transfers to Abstainers alone	Transfers to Abstainers combined with Abstainers	Transfers to Non-Abstainers combined with Abstainers	Normal rate of Abstainers without transfers	Transfers to Abstainers alone are	Transfers to Abstainers combined with Abstainers	Transfers to Non-Abstainers combined with Abstainers	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
– 9	...	1·299	1·299	1·299	...	100·00	100·00	– 9
10–14	...	·190	·189	·190	...	100·00	99·47	10–14
15–19	...	·665	·663	·668	...	99·54	99·24	15–19
20–24	·813	·466	·479	·463	175·60	100·60	103·40	20–24
25–29	·694	·410	·410	·406	171·00	101·00	101·00	25–29
30–34	·210	·404	·421	·408	51·46	99·01	103·20	30–34
35–39	·313	·440	·472	·444	70·49	99·11	106·30	35–39
40–44	·423	·542	·578	·547	77·32	99·08	105·70	40–44
45–49	·948	·760	·806	·749	126·60	101·50	107·60	45–49
50–54	·930	1·041	1·079	1·049	88·65	99·24	102·80	50–54
55–59	1·582	1·666	1·787	1·673	94·56	99·59	106·80	55–59
60–64	2·596	2·568	2·605	2·565	101·20	100·10	101·60	60–64
65–69	4·334	4·267	4·428	4·260	101·70	100·20	103·90	65–69
70–74	6·130	6·193	6·280	6·199	98·90	99·91	101·30	70–74
75–79	8·936	11·347	11·424	11·607	76·97	97·77	98·38	75–79
80–84	13·592	15·062	15·771	15·230	89·23	98·88	103·50	80–84
85–89	13·333	20·029	20·116	20·497	65·01	97·70	98·13	85–89
90–94	100·000	28·070	25·423	25·455	392·70	110·20	99·84	90–94

Mortality of the Non-Abstainers has been increased by the importation into their ranks of unhealthy withdrawals from the Abstainers' Section.

(34.) A minor question is—Are the Non-Abstainers injured by the withdrawal of their select lives who may become Abstainers? Passing the indirect suggestion by this question that Abstinence is beneficial, we refer to Columns 4 and 8 of Table XVIII, which show what the Mortality of the Non-Abstainers would have been had the lives transferred not been withdrawn. Again we see that the results are not materially influenced.

(35.) Conversely, what has been the effect of the transfers on the Abstainers' Section? The chief question in this connection is—"Has the Abstainers' Section been relieved by the withdrawal of the lives transferred to the Non-Abstainers' Section?" We have already seen (paragraph 32) that the mortality among these has been rather in excess of that of the Non-Abstainers. Still more must it be in excess of the Abstainers' normal Mortality. Columns 4 and 8 of Table XIX show to what extent the Abstainers' Mortality would have been increased had these lives not been withdrawn. We see (col. 8) that there has been an increase, and had the numbers so withdrawn been large, the relief enjoyed by the Abstainers' Section must have been considerable. Columns 2 and 6, and Columns 3 and 7 of Table XIX show respectively the Mortality of transfers to the Abstainers' Section, and of the combination of these transfers with the Abstainers generally. It is interesting to compare Column 2 of Table XVIII with the corresponding Column 2 of Table XIX, showing the relative mortality of those transferred from the Abstainers' Section, and those transferred thereto.

MONETARY TABLES BASED UPON ABSTAINERS' MORTALITY.

(36.) From the data given in Table IV (Healthy Male Abstainer's Whole-Life Policies, Aggregate Experience 1841-1901) a Mortality Table (which I call T^M) has been prepared. It was assumed for ages below 23 that q_x (T^M) was equal to q_{x+2} (O^M), and for ages 75 and upwards that the T^M rate was the same as the O^M. For ages 23-74 the Abstainers' Mortality (Healthy Males Table IV) was followed, and graduated by a simple "graphic" method, for which no mathematical accuracy is claimed. The functions l_x, d_x, p_x, q_x, and the Commutation Columns (with 3 per-cent interest) D_x and N_x are given on Table XXI. In Table XXII are given for quinary ages the values of

TABLE XX.

Mortality of Healthy Males, Abstainers, Whole-Life Policies, 1841–1901 [T^M]. *Showing out of* 100,000 *living at ages* 10, 20, 30, *&c., the numbers surviving to the succeeding decennial ages according to* T^M *and* O^M *Tables respectively. Also the additional survivors by the* T^M *Table.*

Age attained	COMMENCING AGE 10			COMMENCING AGE 20			COMMENCING AGE 30		
	By T^M	By O^M	Additional Survivors by T^M	By T^M	By O^M	Additional Survivors by T^M	By T^M	By O^M	Additional Survivors by T^M
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
10	100,000	100,000	...	...	...	...	...	...	...
20	96,314	96,453	−139	100,000	100,000	...	...	...	...
30	92,249	91,942	+307	95,779	95,323	456	100,000	100,000	...
40	88,373	85,467	2,906	91,755	88,609	3,146	95,799	92,959	2,840
50	82,853	76,185	6,668	86,024	78,986	7,038	89,815	82,863	6,952
60	72,036	62,073	9,963	74,793	64,355	10,438	78,089	67,513	10,576
70	51,089	40,615	10,474	53,044	42,109	10,935	55,382	44,175	11,207
80	20,372	15,530	4,842	21,152	16,101	5,051	22,084	16,891	5,193
90	2,094	1,596	498	2,174	1,655	519	2,269	1,736	533
Age attained	COMMENCING AGE 40			COMMENCING AGE 50			COMMENCING AGE 60		
	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
40	100,000	100,000	...	...	...	...	...	...	...
50	93,754	89,139	4,615	100,000	100,000	...	...	...	...
60	81,514	72,628	8,886	86,944	81,476	5,468	100,000	100,000	...
70	57,811	47,521	10,290	61,662	53,311	8,351	70,922	65,432	5,490
80	23,053	18,171	4,882	24,588	20,384	4,204	28,281	25,019	3,262
90	2,369	1,867	502	2,527	2,095	432	2,906	2,571	335

TABLE XXII.

Comparison of certain functions based upon ABSTAINERS' MORTALITY T^M.

Ages	e_x			a_x 3 PER-CENT			125· P_x 3 PER-CENT		Ages
	T^M	H^M	O^M	T^M	H^M	O^M	T^M	Carlisle. Being Institution's Whole-Life Rate	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
							£ s. d.	£ s. d.	
10	55·021	49·791	51·459	25·471	24·148	24·669	1 1 7	1 9 2	10
15	50·973	45·661	47·323	24·687	23·158	23·751	1 4 6	1 13 3	15
20	46·949	41·561	43·182	23·863	22·043	22·705	1 7 9	1 17 4	20
25	42·967	37·905	39·083	22·930	21·038	21·539	1 11 8	2 2 7	25
30	38·827	34·181	35·067	21·786	19·867	20·264	1 16 11	2 8 10	30
35	34·595	30·516	31·159	20·428	18·587	18·885	2 3 10	2 15 7	35
40	30·328	26·899	27·360	18·856	17·176	17·394	2 13 1	3 4 11	40
45	26·100	23·292	23·668	17·084	15·594	15·782	3 5 5	3 15 5	45
50	22·016	19·806	20·107	15·165	13·896	14·054	4 1 10	4 10 6	50
55	18·130	16·462	16·722	13·125	12·094	12·239	5 4 2	5 13 8	55
60	14·554	13·330	13·571	11·054	10·236	10·384	6 14 7	7 4 9	60
65	11·338	10·512	10·716	9·011	8·418	8·551	8 16 11	8 19 3	65
70	8·491	7·995	8·208	7·037	6·657	6·810	11 18 3	11 15 1	70

e_x, a_x, and P_x, also $125 \cdot P_x$ for comparison with the Office Whole-Life Premiums of the Institution, which are Carlisle 3 per-cent with 25 per-cent loading. It will be observed that the difference between these Office premiums and the loaded T^M premium is, roughly, constant.

(37.) In Diagram II are shown the approximate curves of the function l_x according to the T^M and O^M Tables, the abscissæ being the ages, and the ordinates the numbers living. In Table XX are shown out of 100,000 living at the ages, 10, 20, 30, &c., the numbers surviving to the succeeding decennial ages according to the T^M and O^M Tables, also the additional survivors by the former Table at those succeeding decennial ages. This Table should be read thus, of 100,000 living at age 10, 82,853 would survive to age 50, according to the Institution's Temperance Mortality Experience. But according to the experience of ordinary Healthy Assured Lives (O^M) only 76,185 would survive, showing 6,668 additional survivors on the Temperance Experience. Or, out of 100,000 persons living at age 30, 78,089 would survive to age 60 on the Temperance Experience, and 67,513 on the Ordinary Healthy Lives' Experience, showing 10,576 additional survivors on the Temperance Experience.

(38.) The general increase in length of life which may be claimed as following on the practice of abstinence may be best presented in a popular form by a consideration of the function e_x, Table XXII. At age 30, when a man's constitution and habits of life may be considered as settled, we find the average number of years enjoyed thereafter by Non-Abstainers, according to the O^M Table, to be 35·1. But according to the Abstainers' Table it is 38·8 years, an increase of nearly 11 per-cent. At age 40 these figures are respectively 27·4 years and 30·3 years, also an increase of nearly 11 per-cent.

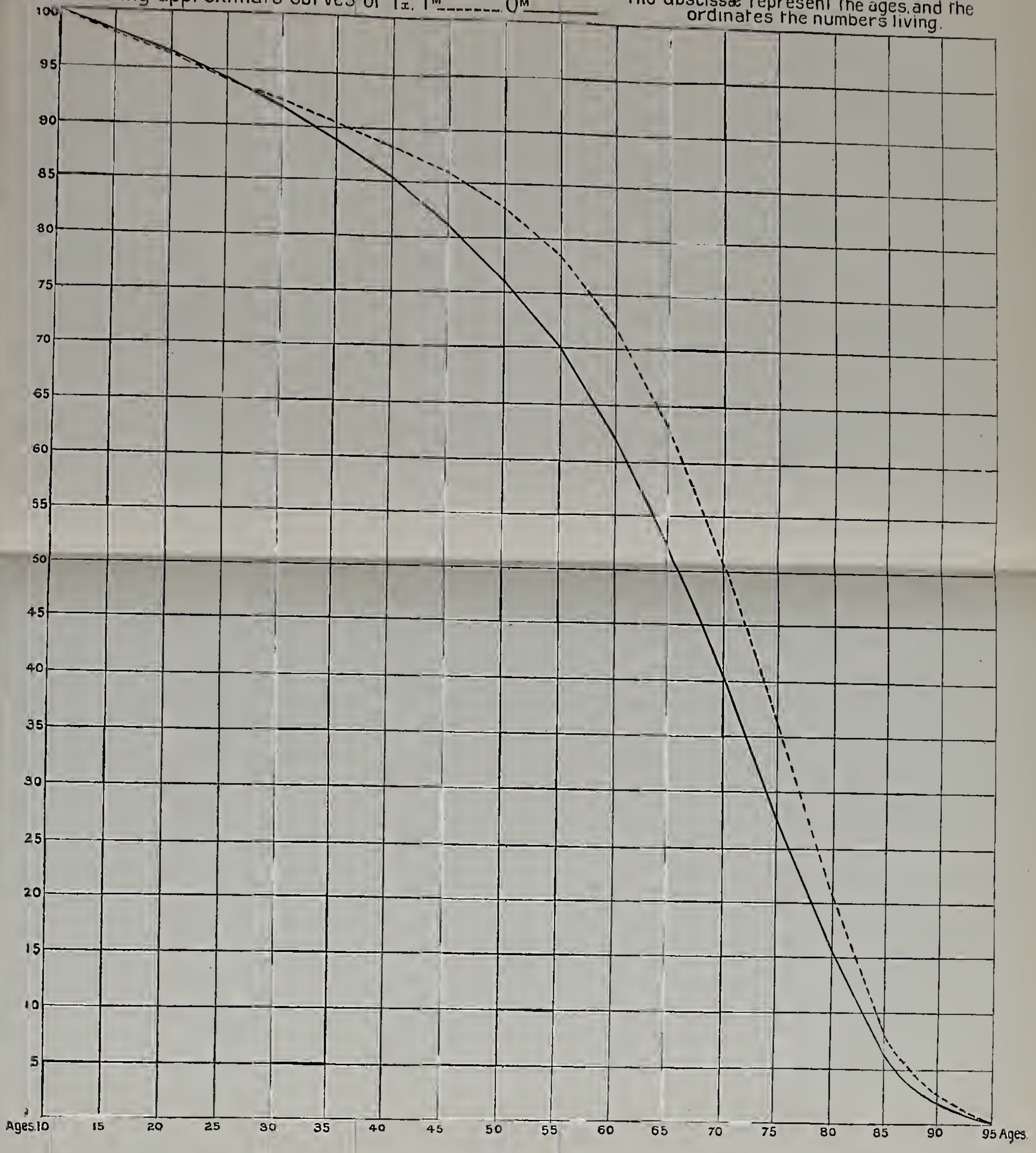
If an increased collective vitality (and what may reasonably be associated with it, namely, increased working capacity) to the extent of over 10 per-cent be an advantage to the community, these figures should be a striking testimony of the benefits that would arise from a general adoption of total abstinence at an early age, and the retention of the practice through life.

(39.) In conclusion, if it be granted—

(*a*) That the average pecuniary positions of the Abstainers and Non-Abstainers assured in the Institution are approximately equal; or, in other words, that they belong to the same social class;

Diagram II.

Showing approximate curves of l_x, T^m - - - - - - O^m ——— The abscissæ represent the ages, and the ordinates the numbers living.



(*b*) That the Members of the two sections are admitted, and afterwards dealt with on equal terms ;

(*c*) That the methods used by me in this investigation are correct;

then, bearing in mind that the point chiefly in view in this paper has been to compare the Mortality of a body of Abstainers with that of a similarly circumstanced body of Non-Abstainers, I submit that the data now put forward, and the results deduced therefrom, prove—

Firstly : That the Non-Abstainers assured in the Institution are good average lives, generally equal to the best accepted standard of assured life, namely, the O^M Table.

Secondly : That the Abstainers show a marked superiority to the Non-Abstainers throughout the entire working years of life, for every class of Policy, and for both sexes, however tested.

Thirdly : That this superiority has not been brought about by the operation of the "Transfers" between the two sections.

Fourthly : That the financial working of the Institution in the allotment of Bonuses as between the Abstainers' and Non-Abstainers' Sections has not been influenced by such transfers.

Table III.

Healthy Males. Non-Abstainers.
Whole-Life Policies. *"Transfers to" excluded.*
Entrants 1841–1901. *Experience* 1841–1901.

Age (x)	Entered at Age (x)	Passed from Observation at Age (x) as Trans-ferred					Exposed to Risk	Died	Rate of Mortality	Age (x)
		Trans-ferred	Void	Surren-dered	Died	Existing 31 Dec. 1901				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
0	...	...	...	...	...	...	...	...	...	0
1	...	...	...	...	...	...	...	...	...	1
2	...	...	...	...	...	...	...	...	...	2
3	...	...	...	...	...	...	...	...	...	3
4	...	...	...	...	...	...	...	...	...	4
5	3	...	...	...	...	...	2	...	...	5
6	6	...	1	...	...	...	6	...	...	6
7	8	...	...	...	...	...	12	...	...	7
8	10	...	...	...	...	...	21	...	...	8
9	17	...	1	...	...	...	33	...	...	9
10	37	...	4	...	1	...	59	1	·01709	10
11	29	...	4	...	...	...	85	...	...	11
12	35	...	8	...	...	1	112	...	...	12
13	49	1	6	2	...	...	144	...	...	13
14	63	...	9	2	...	1	190	...	...	14
15	64	1	7	1	...	...	243	...	...	15
16	100	1	14	3	2	...	310	2	·00645	16
17	117	2	21	3	1	3	394	1	·00254	17
18	173	1	31	1	4	10	505	4	·00793	18
19	241	3	43	5	3	6	652	3	·00460	19
20	379	4	61	8	6	8	891	6	·00674	20
21	570	8	99	9	10	16	1,251	10	·00799	21
22	827	10	130	12	13	17	1,787	13	·00728	22
23	943	10	181	24	18	30	2,451	18	·00734	23
24	1,042	14	256	16	16	46	3,136	16	·00510	24
25	1,107	22	257	32	22	43	3,850	22	·00571	25
26	1,181	16	287	27	18	60	4,605	18	·00391	26
27	1,264	15	324	35	35	59	5,393	35	·00649	27
28	1,285	25	311	49	33	71	6,195	33	·00533	28
29	1,419	31	306	53	49	80	7,056	49	·00695	29
30	1,367	41	343	52	51	83	7,903	51	·00645	30
31	1,306	30	311	59	55	89	8,691	55	·00633	31
32	1,389	29	332	71	89	92	9,476	89	·00939	32
33	1,238	41	341	93	78	100	10,154	78	·00766	33
34	1,267	35	359	100	66	119	10,741	66	·00615	34
35	1,218	34	335	100	85	125	11,321	85	·00751	35
36	1,147	47	331	74	103	104	11,833	103	·00870	36
37	1,039	33	314	100	97	129	12,272	97	·00790	37
38	1,032	47	268	87	97	127	12,662	97	·00766	38
39	976	41	301	96	113	144	13,018	113	·00868	39
40	860	58	273	97	150	137	13,250	150	·01132	40
41	810	34	255	92	114	152	13,396	114	·00851	41
42	797	46	259	108	135	164	13,535	135	·00997	42
43	687	39	220	122	107	163	13,586	107	·00788	43
44	690	37	190	100	139	217	13,656	139	·01018	44
45	570	42	205	111	165	228	13,584	165	·01215	45
46	525	40	172	115	148	216	13,401	148	·01105	46
47	461	36	171	89	160	214	13,218	160	·01211	47
48	392	30	146	94	190	232	12,991	190	·01463	48
49	447	38	119	82	183	216	12,737	183	·01438	49
Carried forward	29,187	942	7,606	2,124	2,556	3,502	280,808	2,556	...	

Table III (*continued*).

Age (x)	Entered at Age (x)	Passed from Observation at Age (x) as					Exposed to Risk	Died	Rate of Mortality	Age (x)
		Transferred	Void	Surrendered	Died	Existing 31 Dec. 1901				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Brought forward	29,187	942	7,606	2,124	2,556	3,502	280,808	2,556	...	
50	354	38	117	87	194	234	12,498	194	·01552	50
51	301	36	104	91	193	227	12,165	193	·01588	51
52	292	34	100	93	190	230	11,813	190	·01609	52
53	245	44	93	87	202	234	11,438	202	·01766	53
54	226	26	89	84	213	245	11,027	213	·01932	54
55	203	26	66	90	243	293	10,596	243	·02293	55
56	145	32	67	73	230	264	10,056	230	·02287	56
57	123	22	41	58	216	255	9,552	216	·02261	57
58	112	21	48	43	219	277	9,082	219	·02411	58
59	127	22	37	57	228	279	8,593	228	·02653	59
60	80	25	31	62	235	236	8,074	235	·02911	60
61	56	22	39	63	251	264	7,547	251	·03326	61
62	58	10	23	71	248	207	6,979	248	·03554	62
63	57	16	21	43	191	204	6,489	191	·02943	63
64	44	6	11	49	223	234	6,072	223	·03672	64
65	31	13	17	40	231	229	5,584	231	·04137	65
66	30	2	10	49	256	176	5,091	256	·05029	66
67	26	8	11	29	239	192	4,631	239	·05160	67
68	20	5	4	29	233	204	4,182	233	·05572	68
69	23	5	9	16	217	164	3,731	217	·05816	69
70	9	5	6	23	189	203	3,335	189	·05668	70
71	7	6	9	19	197	157	2,916	197	·06756	71
72	6	7	7	25	194	119	2,533	194	·07659	72
73	3	6	1	16	187	111	2,193	187	·08525	73
74	2	3	4	7	155	109	1,880	155	·08245	74
75	1	2	4	12	135	101	1,601	135	·08435	75
76	1	1	3	9	143	75	1,350	143	·10589	76
77	1	...	1	5	123	60	1,124	123	·10943	77
78	1	1	1	5	95	68	937	95	·10144	78
79	2	...	...	5	118	44	768	118	·15355	79
80	...	...	...	6	86	40	602	86	·14286	80
81	...	...	1	2	65	45	471	65	·13800	81
82	...	...	...	3	63	24	359	63	·17573	82
83	...	...	1	2	50	28	269	50	·18587	83
84	...	...	...	...	43	14	189	43	·22752	84
85	...	...	...	1	25	14	131	25	·19011	85
86	...	...	...	1	22	8	92	22	·24044	86
87	...	...	...	...	11	7	61	11	·18033	87
88	...	...	...	...	12	...	43	12	·27907	88
89	...	...	...	...	9	2	31	9	·29032	89
90	...	...	...	...	6	...	20	6	·30000	90
91	...	...	...	...	6	...	14	6	·42857	91
92	...	...	...	...	...	3	8	...	·00000	92
93	...	...	...	...	3	...	5	3	·60000	93
94	...	...	...	...	1	...	2	1	·50000	94
95	...	...	...	...	1	...	1	1	1·00000	95
96	...	...	...	...	...	...	...	...	...	96
97	...	...	...	...	...	...	...	...	...	97
98	...	...	...	...	...	...	...	...	...	98
99	...	...	...	...	...	...	...	...	...	99
All Ages	31,776	1,386	8,582	3,479	8,947	9,382	466,943	8,947	...	All Ages

TABLE IV.

Healthy Males. ABSTAINERS.

Whole-Life Policies. "*Transfers to*" *excluded.*

Entrants 1841–1901. *Experience* 1841–1901.

Age (*x*)	Entered at Age (*x*)	PASSED FROM OBSERVATION AT AGE (*x*) AS					Exposed to Risk	Died	Rate of Mortality	Age (*x*)
		Transferred	Void	Surrendered	Died	Existing 31 Dec. 1901				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
0	...	...	...	...	...	...	...	...	...	0
1	...	...	...	...	...	...	...	...	...	1
2	...	...	...	...	...	...	...	...	...	2
3	...	...	...	...	...	...	...	...	...	3
4	1	...	...	...	...	...	1	...	...	4
5	...	...	...	...	...	...	1	...	...	5
6	4	...	1	...	...	...	3	...	...	6
7	9	...	1	...	...	...	7	...	...	7
8	21	...	1	...	...	...	22	...	...	8
9	27	...	3	...	1	...	43	1	·022988	9
10	45	1	5	...	1	1	74	1	·013514	10
11	79	...	6	...	...	1	128	...	...	11
12	78	...	7	1	...	8	198	...	...	12
13	105	1	7	...	...	9	273	...	...	13
14	154	1	22	...	1	6	378	1	·002649	14
15	191	...	10	2	2	15	526	2	·003799	15
16	197	...	36	4	3	21	674	3	·004454	16
17	271	5	35	2	9	31	843	9	·010676	17
18	360	7	44	1	5	48	1,070	5	·004673	18
19	474	9	46	6	11	49	1,378	11	·007980	19
20	731	10	60	10	8	77	1,849	8	·004328	20
21	919	19	94	19	14	81	2,477	14	·005651	21
22	984	37	153	21	19	109	3,155	19	·006022	22
23	1,018	31	175	31	18	140	3,802	18	·004734	23
24	1,161	46	192	34	14	121	4,477	14	·003127	24
25	1,186	45	219	49	23	189	5,219	23	·004407	25
26	1,204	60	219	41	21	163	5,885	21	·003568	26
27	1,183	60	224	56	28	163	6,565	28	·004265	27
28	1,183	72	198	63	26	193	7,223	26	·003600	28
29	1,179	71	200	72	35	197	7,848	35	·004460	29
30	1,149	80	234	66	28	204	8,413	28	·003328	30
31	1,076	75	243	80	40	212	8,904	40	·004493	31
32	1,074	85	219	88	42	192	9,334	42	·004500	32
33	1,037	98	203	93	35	220	9,765	35	·003584	33
34	978	84	194	89	45	237	10,139	45	·004438	34
35	920	69	224	91	42	232	10,426	42	·004028	35
36	863	74	199	91	52	248	10,672	52	·004873	36
37	804	73	185	64	35	248	10,865	35	·003221	37
38	742	79	177	80	63	275	11,027	63	·005713	38
39	735	72	164	72	48	272	11,107	48	·004322	39
40	697	68	167	93	58	271	11,185	58	·005186	40
41	624	61	161	87	55	272	11,198	55	·004912	41
42	580	81	141	79	66	292	11,171	66	·005908	42
43	561	66	172	76	55	293	11,072	55	·004967	43
44	518	58	130	79	70	323	10,978	70	·006376	44
45	487	52	125	108	73	349	10,813	73	·006752	45
46	379	64	115	88	75	365	10,548	75	·007100	46
47	373	43	94	64	78	316	10,253	78	·007608	47
48	349	57	103	58	75	341	10,010	75	·007493	48
49	366	50	78	57	84	304	9,753	84	·008613	49
Carried forward	27,076	1,864	5,286	2,015	1,358	7,088	261,752	1,358	...	

TABLE IV—(*continued*).

Age (x)	Entered at Age (x)	PASSED FROM OBSERVATION AT AGE (x) AS					Exposed to Risk	Died	Rate of Mortality	Age (x)
		Trans-ferred	Void	Surren-dered	Died	Existing 31 Dec. 1901				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Brought forward	27,076	1,864	5,286	2,015	1,358	7,088	261,752	1,358	...	
50	288	42	99	59	86	315	9,496	86	·009056	50
51	251	46	65	62	66	369	9,183	66	·007188	51
52	227	39	67	54	105	267	8,820	105	·011905	52
53	190	47	62	48	99	290	8,498	99	·011649	53
54	175	35	52	63	107	285	8,141	107	·013144	54
55	140	41	38	38	114	289	7,773	114	·014665	55
56	138	28	49	58	110	271	7,382	110	·014901	56
57	93	31	45	42	110	258	6,991	110	·015734	57
58	99	29	37	48	124	261	6,604	124	·018776	58
59	100	20	24	35	127	263	6,224	127	·020407	59
60	63	29	30	36	119	245	5,827	119	·020422	60
61	55	27	20	37	130	238	5,434	130	·023921	61
62	44	30	16	42	126	229	5,030	126	·025050	62
63	31	13	10	34	128	164	4,641	128	·027580	63
64	31	13	7	21	145	191	4,331	145	·033483	64
65	16	19	10	18	157	194	3,974	157	·039502	65
66	15	9	9	18	142	167	3,597	142	·039478	66
67	19	14	4	20	126	136	3,270	126	·038538	67
68	12	11	5	23	145	161	2,984	145	·048593	68
69	15	13	1	21	132	118	2,654	132	·049727	69
70	2	7	2	17	114	128	2,383	114	·047839	70
71	4	8	2	19	133	126	2,117	133	·062839	71
72	1	12	3	17	133	75	1,829	133	·072718	72
73	2	11	...	12	104	73	1,595	104	·065182	73
74	2	3	1	12	94	71	1,401	94	·067120	74
75	...	5	...	7	105	68	1,223	105	·085854	75
76	...	5	1	5	112	57	1,038	112	·107900	76
77	1	2	1	8	108	46	858	108	·125800	77
78	2	1	2	5	108	48	697	108	·154950	78
79	1	3	1	5	72	36	535	72	·134700	79
80	1	2	1	3	54	30	419	54	·128880	80
81	...	1	...	1	51	25	332	51	·153610	81
82	...	1	1	2	50	9	253	50	·197240	82
83	...	...	...	1	30	10	192	30	·156660	83
84	...	1	...	1	20	10	150	20	·133330	84
85	...	...	...	...	22	13	119	22	·184870	85
86	...	1	...	1	21	5	83	21	·253010	86
87	...	...	...	2	12	5	55	12	·218180	87
88	...	...	...	...	7	2	37	7	·189190	88
89	...	...	...	...	4	3	28	4	·142860	89
90	...	...	...	...	3	3	21	3	·142860	90
91	...	...	...	...	4	...	15	4	·266670	91
92	...	...	...	...	5	1	11	5	·454545	92
93	...	...	...	...	2	...	5	2	·400000	93
94	...	...	...	...	...	1	3	...	...	94
95	...	...	...	...	...	...	2	...	...	95
96	...	...	...	1	...	...	1	...	...	96
97	...	...	...	...	...	...	1	...	...	97
98	...	...	...	...	...	1	1	...	...	98
99	...	...	...	...	...	...	...	...	...	99
All Ages	29,094	2,463	5,951	2,911	5,124	12,645	398,010	5,124	...	All Ages

TABLE XVI.—*Healthy Males. Whole-Life Policies.*
Showing effect of TRANSFERS TO NON-ABSTAINERS.

Transfers 1847–1901. *Experience* 1847–1901.

Age (x)	Transferred to at Age (x)	PASSED FROM OBSERVATION AT AGE (x) AS					Exposed to Risk	Died	Rate of Mortality	Age (x)
		Transferred from	Void	Surr'd	Died	Existing 31 Dec. 1901				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
10	1	...	...	...	...	...				10
11	...	...	...	...	...	...				11
12	...	...	...	...	...	...				12
13	...	...	...	...	...	...				13
14	1	...	...	...	...	...				14
	2	...	...	...	...	...	5	...	...	
15	...	...	...	...	...	...				15
16	...	...	...	...	...	...				16
17	5	...	...	...	...	...				17
18	8	...	...	...	...	2				18
19	9	...	...	1	...	1				19
	22	...	...	1	...	3	37	...	...	
20	16	...	...	...	...	5				20
21	15	...	2	...	...	2				21
22	38	...	...	...	1	5				22
23	34	...	3	...	2	7				23
24	49	1	5	1	1	4				24
	152	1	10	1	4	23	332	4	·01205	
25	43	1	5	...	...	12				25
26	57	1	2	3	...	4				26
27	64	2	5	2	3	12				27
28	76	1	5	3	...	15				28
29	88	...	4	6	3	17				29
	328	5	21	14	6	60	1,179	6	·00509	
30	81	3	4	7	2	19				30
31	79	2	8	4	5	17				31
32	93	1	6	7	2	28				32
33	105	3	3	8	4	30				33
34	90	2	2	8	3	46				34
	448	11	23	34	16	140	2,431	16	·00658	
35	72	1	13	8	6	25				35
36	85	4	7	4	4	29				36
37	83	3	5	8	6	30				37
38	78	1	4	12	8	49				38
39	77	4	7	8	7	40				39
	395	13	36	40	31	173	3,296	31	·00941	
40	65	5	11	2	3	45				40
41	67	6	4	6	7	45				41
42	88	1	6	9	11	41				42
43	72	2	2	6	7	49				43
44	63	8	4	6	10	43				44
	355	22	27	29	38	223	3,579	38	·01062	
45	61	9	3	6	6	41				45
46	67	5	5	4	17	50				46
47	46	4	2	7	9	43				47
48	56	4	6	7	10	37				48
49	53	3	4	5	15	48				49
	283	25	20	29	57	219	3,482	57	·01637	
Carried forward	1,985	77	137	148	152	841	14,341	152	...	...

TABLE XVI—*continued.*

Age (x)	Transferred to at Age (x)	PASSED FROM OBSERVATION AT AGE (x) AS					Exposed to Risk	Died	Rate of Mortality	Age (x)
		Transferred from	Void	Surr'd	Died	Existing 31 Dec. 1901				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Brought forward	1,985	77	137	148	152	841	14,341	152	...	
50	47	5	1	11	12	52				50
51	49	3	3	6	11	29				51
52	47	7	3	4	7	36				52
53	52	4	2	5	7	49				53
54	38	5	2	8	9	43				54
	233	**24**	**11**	**34**	**46**	**209**	3,050	46	·01508	
55	45	...	1	4	12	31				55
56	37	4	3	5	18	50				56
57	43	3	1	4	17	35				57
58	35	3	1	2	15	40				58
59	25	3	...	5	24	30				59
	185	**13**	**6**	**20**	**86**	**186**	2,566	86	·03352	
60	32	1	2	4	9	34				60
61	36	2	1	2	15	41				61
62	32	1	...	6	9	39				62
63	19	3	...	3	17	40				63
64	15	4	1	3	9	23				64
	134	**11**	**4**	**18**	**59**	**177**	1,879	59	·03141	
65	24	1	...	2	14	22				65
66	10	2	...	4	18	27				66
67	17	1	...	...	16	19				67
68	13	...	...	4	13	15				68
69	15	...	...	2	19	21				69
	79	**4**	...	**12**	**80**	**104**	1,182	80	·06771	
70	8	...	...	5	11	15				70
71	9	...	...	...	8	12				71
72	12	...	...	2	16	11				72
73	13	..	...	1	5	25				73
74	4	...	...	...	7	13				74
	46	...	...	**8**	**47**	**76**	627	47	·07496	
75	6	...	...	1	8	5				75
76	5	...	...	1	3	11				76
77	2	...	...	1	5	9				77
78	1	...	...	...	4	5				78
79	3	...	...	...	3	2				79
	17	...	...	**3**	**23**	**32**	271	23	·08487	
80	2	...	...	...	6	5				80
81	1	...	...	...	8	3				81
82	...	...	...	...	1	...				82
83	...	...	1	...	1	...				83
84	1	...	...	...	5	...				84
	4	...	**1**	...	**21**	**8**	87	21	·24138	
85	1	...	...	...	...	1				85
86	1	...	...	...	2	1				86
87	...	...	...	...	...	2				87
88	...	...	...	...	...	...				88
89	...	...	...	...	...	...				89
	2	...	...	...	**2**	**4**	16	2	·12500	
90	...	...	...	...	...	...				90
91	...	...	...	...	...	...				91
92	...	...	...	...	...	...				92
93	...	...	...	...	1	...				93
94	...	...	...	...	...	...				94
	...	...		...	**1**	...	4	1	·25000	
All Ages	2,685	129	159	243	517	1,637	24,023	517	...	All Ages

Table XVII—*Healthy Males. Whole-Life Policies.*
Showing effect of Transfers to Abstainers.

Transfers 1851–1901. *Experience* 1851–1901.

Age (*x*)	Transferred to at Age (*x*)	Passed from Observation at Age (*x*) as					Exposed to Risk	Died	Rate of Mortality	Age (*x*)
		Transferred from	Void	Surr'd	Died	Existing 31 Dec. 1901				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
10	...	...	...	...	...	...				10
11	...	...	...	...	...	...				11
12	1	...	...	...	...	...				12
13	1	...	1	...	...	...				13
14	...	...	...	...	...	...				14
	2	...	**1**	...	...	...	2	...	...	
15	2	...	...	...	...	...				15
16	...	...	...	...	...	...				16
17	2	...	...	...	...	...				17
18	1	...	...	...	...	...				18
19	3	...	...	...	...	...				19
	8	...	...	...	...	...	22	...	...	
20	4	...	...	...	...	...				20
21	7	...	...	1	...	...				21
22	11	...	...	1	...	...				22
23	9	...	2	...	1	1				23
24	13	...	2	...	...	...				24
	44	...	**4**	**2**	**1**	**1**	123	1	·00813	
25	22	...	1	2	...	...				25
26	20	1	2	...	...	...				26
27	17	1	2	...	1	1				27
28	26	4	2	2	2	...				28
29	26	6	3	2	...	2				29
	111	**12**	**10**	**6**	**3**	**3**	433	3	·00694	
30	41	2	1	2	...	1				30
31	29	...	1	3	1	3				31
32	29	5	3	1	...	1				32
33	42	4	...	4	...	3				33
34	37	5	5	1	1	5				34
	178	**16**	**10**	**11**	**2**	**13**	951	2	·00210	
35	33	1	4	4	...	4				35
36	52	5	5	1	...	4				36
37	35	5	3	2	...	4				37
38	49	1	1	3	3	1				38
39	42	3	1	...	2	1				39
	211	**15**	**14**	**10**	**5**	**14**	1,597	5	·00313	
40	58	2	7	2	2	1				40
41	38	6	5	6	1	3				41
42	46	6	3	7	2	8				42
43	38	5	1	7	3	7				43
44	43	5	1	4	2	6				44
	223	**24**	**17**	**26**	**10**	**25**	2,363	10	·00423	
45	47	6	3	4	5	13				45
46	46	2	3	7	3	7				46
47	37	2	4	1	8	11				47
48	33	1	1	6	4	15				48
49	38	2	1	1	7	13				49
	201	**13**	**12**	**19**	**27**	**59**	2,849	27	·00948	
Carried forward	978	80	68	74	48	115	8,340	48	...	

Table XVII—*continued.*

Age (*x*)	Transferred to at age (*x*)	Passed from Observation at Age (*x*) as					Exposed to Risk	Died	Rate of Mortality	Age (*x*)
		Transferred from	Void	Surr'd	Died	Existing 31 Dec. 1901				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Brought forward	978	80	68	74	48	115	8,340	48	...	
50	41	3	1	5	4	17				50
51	36	3	2	...	4	15				51
52	41	7	5	4	11	15				52
53	46	3	1	6	7	26				53
54	29	2	2	2	3	21				54
	193	**18**	**11**	**17**	**29**	**94**	3,118	29	·00930	
55	26	4	...	1	11	22				55
56	36	6	2	...	9	28				56
57	24	11	2	4	9	28				57
58	25	6	...	7	6	28				58
59	25	5	...	1	12	19				59
	136	**32**	**4**	**13**	**47**	**125**	2,971	47	·01582	
60	27	5	1	4	12	15				60
61	24	5	1	1	15	19				61
62	11	2	...	5	15	19				62
63	17	5	...	7	11	24				63
64	9	...	...	2	12	25				64
	88	**17**	**2**	**19**	**65**	**102**	2,504	65	·02596	
65	14	5	...	1	23	33				65
66	4	1	...	1	16	21				66
67	8	3	...	1	11	18				67
68	6	2	...	2	13	17				68
69	5	2	...	4	11	21				69
	37	**13**	...	**9**	**74**	**110**	1,707	74	·04334	
70	2	1	2	1	11	32				70
71	7	...	...	1	14	18				71
72	7	...	...	1	19	13				72
73	7	2	...	...	6	15				73
74	6	2	...	...	6	6				74
	29	**5**	**2**	**3**	**56**	**84**	914	56	·06130	
75	1	...	...	...	10	6				75
76	1	...	...	...	7	11				76
77	...	...	...	...	10	7				77
78	1	...	1	...	7	5				78
79	1	...	...	...	8	5				79
	4	...	**1**	...	**42**	**34**	470	42	·08936	
80	...	...	...	1	6	4				80
81	...	...	...	...	6	5				81
82	...	...	...	...	1	8				82
83	...	...	...	...	7	3				83
84	...	...	...	...	1	2				84
				1	**21**	**22**	154	21	·13592	
85	...	1	...	...	...	1				85
86	...	...	...	...	1	...				86
87	...	...	...	..	2	1				87
88	...	...	...	...	...	...				88
89	...	...	...	...	...	...				89
		1	...	...	**3**	**2**	23	3	·13333	
90	...	...	...	...	2	...				90
91	...	...	...	...	...	...				91
92	...	...	...	...	...	...				92
93	...	...	...	...	...	...				93
94	...	...	...	...	...	...				94
					2		2	2	1·00000	
All Ages	1,465	166	88	136	387	688	20,203	387	...	All Ages

TABLE XXI.

Mortality Table and auxiliary columns based upon ABSTAINERS' MORTALITY (T^M) *and* 3 *per-cent interest.*

x (1)	l_x (2)	d_x (3)	p_x (4)	q_x (5)		D_x (6)	N_x (7)
10	100,000	347	·99655	·00345	O^M at $x+2$	74,410	1,895,308
11	99,653	344	·99650	·00350		71,993	1,823,315
12	99,309	356	·99646	·00354		69,650	1,753,665
13	98,953	355	·99640	·00360		67,383	1,686,282
14	98,598	362	·99633	·00367		65,186	1,621,096
15	98,236	368	·99625	·00375		63,112	1,557,984
16	97,868	376	·99617	·00383		60,987	1,496,997
17	97,492	381	·99608	·00392		58,985	1,438,012
18	97,111	392	·99596	·00404		57,043	1,380,969
19	96,719	405	·99584	·00416		55,157	1,325,812
20	96,314	416	·99569	·00431		53,327	1,272,485
21	95,898	427	·99554	·00446		51,550	1,220,935
22	95,471	443	·99537	·00463		49,825	1,171,110
23	95,028	430	·99548	·00452		48,149	1,122,961
24	94,598	418	·99560	·00440		46,536	1,076,425
25	94,180	404	·99571	·00429		44,981	1,031,444
26	93,776	393	·99582	·00418		43,483	987,961
27	93,383	379	·99594	·00406		42,041	945,920
28	93,004	379	·99593	·00407		40,650	905,270
29	92,625	376	·99593	·00407		39,305	865,965
30	92,249	376	·99593	·00407		38,005	827,960
31	91,873	375	·99592	·00408		36,749	791,211
32	91,498	375	·99592	·00408		35,532	755,679
33	91,123	379	·99585	·00415		34,356	721,323
34	90,744	383	·99578	·00422		33,216	688,107
35	90,361	388	·99571	·00429		32,112	655,995
36	89,973	393	·99563	·00437		31,043	624,952
37	89,580	397	·99556	·00444		30,008	594,944
38	89,183	402	·99550	·00450		29,005	565,939
39	88,781	408	·99540	·00460		28,027	537,912
40	88,373	424	·99520	·00480		27,091	510,821
41	87,949	443	·99500	·00500		26,176	484,645
42	87,506	466	·99465	·00535		25,287	459,358
43	87,040	495	·99430	·00570		24,419	434,939
44	86,545	525	·99395	·00605		23,572	411,367
45	86,020	559	·99350	·00650		22,747	388,620
46	85,461	594	·99305	·00695		21,941	366,679
47	84,867	632	·99255	·00745		21,154	345,525
48	84,235	671	·99205	·00795		20,385	325,140
49	83,564	711	·99150	·00850		19,634	305,506
50	82,853	757	·99085	·00915		18,899	286,607
51	82,096	822	·99000	·01000		18,181	268,426
52	81,274	868	·98930	·01070		17,475	250,951
53	80,406	940	·98830	·01170		16,785	234,166
54	79,466	1,009	·98730	·01270		16,105	218,061
55	78,457	1,098	·98600	·01400		15,438	202,623
56	77,359	1,184	·98470	·01530		14,778	187,845
57	76,175	1,275	·98327	·01673		14,128	173,717
58	74,900	1,379	·98160	·01840		13,487	160,230
59	73,521	1,485	·97980	·02020		12,853	147,377

TABLE XXI—*continued.*

x	l_x	d_x	p_x	q_x		D_x	N_x
(1)	(2)	(3)	(4)	(5)		(6)	(7)
60	72,036	1,585	·97800	·02200		12,227·0	135,150·0
61	70,451	1,690	·97600	·02400		11,610·0	123,540·0
62	68,761	1,808	·97370	·02630		11,001·0	112,539·0
63	66,953	1,915	·97140	·02860		10,400·0	102,139·0
64	65,038	2,042	·96860	·03140		9,808·2	92,331·0
65	62,996	2,154	·96580	·03420		9,223·4	83,107·6
66	60,842	2,270	·96270	·03730		8,648·5	74,459·1
67	58,572	2,343	·96000	·04000		8,083·5	66,375·6
68	56,229	2,513	·95530	·04470		7,534·1	58,841·5
69	53,716	2,627	·95110	·04890		6,987·6	51,853·9
70	51,089	2,727	·94660	·05340		6,452·4	45,401·5
71	48,362	2,830	·94150	·05850		5,930·1	39,471·4
72	45,532	2,923	·93580	·06420		5,420·5	34,050·9
73	42,609	3,034	·92880	·07120		4,924·7	29,126·2
74	39,575	3,170	·91990	·08010		4,441·0	24,685·2
75	36,405	3,373	·90736	·09264	O^M Rate.	3,966·1	20,719·1
76	33,032	3,317	·89957	·10043		3,493·9	17,225·2
77	29,715	3,234	·89118	·10882		3,051·5	14,173·7
78	26,481	3,123	·88205	·11795		2,640·2	11,533·5
79	23,358	2,986	·87218	·12782		2,261·0	9,272·5
80	20,372	2,820	·86156	·13844		1,914·50	7,358·0
81	17,552	2,633	·85000	·15000		1,601·40	5,756·6
82	14,919	2,423	·83760	·16240		1,321·60	4,435·0
83	12,496	2,196	·82427	·17573		1,074·70	3,360·3
84	10,300	1,958	·80986	·19014		860·04	2,500·27
85	8,342	1,716	·79431	·20569		676·24	1,824·03
86	6,626	1,472	·77787	·22213		521·48	1,302·55
87	5,154	1,237	·75999	·24001		393·83	908·72
88	3,917	1,014	·74113	·25887		290·59	618·13
89	2,903	809	·72119	·27881		209·09	409·04
90	2,094	630	·69925	·30075		146·40	262·64
91	1,464	472	·67742	·32258		99·39	163·25
92	992	345	·65212	·34788		65·37	97·88
93	647	240	·62880	·37120		41·39	56·49
94	407	163	·60000	·40000		25·27	31·22
95	244	104	·57527	·42473		14·72	16·50
96	140	64	·54206	·45794		8·22	8·28
97	76	37	·51724	·48276		4·33	3·95
98	39	19	·50000	·50000		2·17	1·78
99	20	11	·46667	·53333		1·05	·73
100	9	5	·42857	·57143		·48	·25
101	4	3	·33333	·66667		·20	·05
102	1	1	·00000	1·00000		·05	...

ABSTRACT OF DISCUSSION.

Mr. H. W. **MANLY**, in opening the discussion, said the paper was important because it went very far to settle a controversy, which had been raging for a good many years, which hitherto had been argued with very few figures, a great deal of heat sometimes, and generally more from a physiological than from an actuarial point of view. The President, in his inaugural address a year ago, referred to the absence of statistics of abstainers as a separate class. He was sure the members all rejoiced that the Directors of the United Kingdom Temperance and General Institution had consented to the publication of their experience, which had been so admirably compiled by their actuary, Mr. R. M. Moore. He confessed to have had some ideas himself in regard to the difference in mortality, but the experience now presented seemed to have upset them. There were two curious features which seemed to come out in the experience. First, there was the comparative heavy rate of mortality under the age of twenty-five—that applied to both sections—and the sudden increase of the mortality after the age of 75 in the abstainers' section. If the experience which was presented in Table 3 were examined, *i.e.*, the experience of the non-abstainers, it would be seen that, commencing with the age of 35, the rate of mortality ran very closely, in fact agreed exactly, with the O^M Table; but the mortality was greater, from 15 to 35, than in that experience. He thought it was necessary, in examining the tables, to keep in mind that it was not only in one section that the increased mortality amongst the younger members appeared; although when one referred to Table 4, where the abstainers were compared with non-abstainers, the abstainers seemed to have a still larger mortality, under 20, as compared with non-abstainers. He did not know that anything very particular arose out of that. If there was a period in a person's life when one would have supposed that alcohol was exceedingly injurious he should have thought it would have been under the age of 20, and it came to them as a startling surprise to be told it was the reverse. He did not know whether the author could give any explanation of that fact. A prominent point in the paper was Table 14, which showed what one might have expected, namely, that there had been a general improvement in the mortality. It was known that the mortality as shown by the O^M Table, *i.e.*, the experience from 1863 to 1893, was lighter pretty well throughout than the H^M Table, which was an experience up to 1863; and they therefore expected to see an improvement in the mortality in this Institution when the period from 1841 to 1888 was compared with 1841 to 1901. The improved mortality came half-way between the H^M and the O^M, so that both the sections had benefited by the advance in sanitary improvements, and also by the improvement of medical science. There was one thing he wished to greatly emphasize, namely, the danger of using ratios for the purpose of comparisons. Figures were sometimes rather dangerous things, especially when used by people who were not skilled in their use, but ratios he thought were perhaps the most dangerous of all. He might illustrate that point by referring to two of the tables. Table 8 gave particulars of the mortality of those who entered in 1889–1901. If the rate of mortality in the abstainers' section from 15 to 19 was taken, the ridiculous result was obtained that it was infinitely greater than in the non-abstainers'; because there were two deaths out of 1,050 persons exposed, and among the non-abstainers there were no deaths. In the next quinary group the ratio was 24·4, and in the third it was 104·09. If all the numbers under 29 years of age exposed to risk were added together it would be found that the rate of mortality among the abstainers was ·25, and among the non-abstainers ·37, and instead of the extraordinary figures of 24 and 104, we should have 68 as the ratio in col. 8. Similarly, in Table 9 there was a curious case of one death among the abstainers between 10 and 14, and no deaths among the non-abstainers. Therefore the abstainers' mortality was infinitely greater than the non-abstainers'. In the next age, 15 to 19, there were no deaths among the abstainers, and one among the non-abstainers, so that the result was just the reverse; the deaths among the non-abstainers were infinitely greater than among the abstainers. In comparing ratios it was not sufficient to know what the ratios were, but it was necessary also to compare the figures which were the basis of the calculations. If the weight of the observations were taken into consideration, it would be found that very little importance could be attached to the apparently heavy ratio between the mortality among the abstainers and the non-abstainers at the younger ages: a few accidental deaths would upset all the comparisons. He had said that the paper upset some of his own theories. He had had an idea that the transference of presumably bad cases from the abstainers' section to the non-abstainers' must have had a serious effect upon both; and he thought it was a matter of very great satisfaction, and certainly a great relief, to find that there was nothing of the kind; that, in fact, neither section had been at all influenced by the change; and that the experience of those who were transferred from the abstainers to the non-abstainers had not been at all serious; that their falling from grace had not affected their rate of mortality very much. In confirmation of those figures he had a note of the experience of such cases in another office, which did a similar, but smaller, business, to the office referred to in the paper, where there were two sections, and where they transferred from one class to another as the members became abstainers or otherwise. The transfers from the abstainers class to the non-abstainers class were carefully observed for the ten years from 1890 to 1899 by comparing the expected mortality according to the H^M Table with the actual deaths which occurred, the result being that over the ten years the expected was 36·5 by the H^M Table and the actual 15, showing a proportion of only 41 per-cent. deaths to the expected, while in the whole of the abstainers' class the proportion was 53. In that case the falling from grace resulted in an improvement. He thought Mr. Moore was justified in his conclusions; that non-abstainers assured in his institution were good average lives, and generally equal to the O^M Table; that the abstainers showed a marked superiority over non-abstainers throughout the entire working years of life; and thirdly, that the superiority had not been brought about by the operation of the transfers. Two diagrams were given in the paper, but he thought neither of them was the best way of illustrating the tables. The author had been good enough to show him a curve which he thought was much better than the curve in diagram 2, namely, the curve of the abstainers' q_x compared with the q_x of the

O^M Table. That, to him, was very interesting, because it was at once seen where the two mortality tables met, at between the ages of 70–75. The members must not be led away into too wide a generalization from these comparisons, because, although they were true of the class of lives insured in the author's institution, there were tables in existence which showed even a better vitality than the abstainers. Take the class of the clergy assured in the Clergy Mutual from 1829 to 1887. The experience extended over about the same length of time, although at a different period. He did not suppose that from 1829 to 1887 the clergy of the Church of England could be classed as total abstainers; but it was very curious to note that if the expectation of life as exhibited in Table 22 was compared with the expectation of life amongst the clergy, it came out practically half a year less at all ages. He had another table of expectation of life, namely, the experience of the Equitable, for 30 years, from 1863 to 1893. In comparing that with the abstainers' experience he found that the expectation of life at the younger ages in the abstainers' table was nearly one year longer than in the Equitable; at 35 there was a difference of three-quarters of a year; at 45 one-third of a year; but at 55 it was just the other way—the Equitable experience was slightly better, and increased in that respect to the end of life. At age 70 the Equitable experience gave a quarter of a year longer expectation than the experience in the paper. The class of people represented by these figures he had given were well-to-do merchants or professional men with a little sprinkling of the aristocracy. The experience in itself was very good, but, of course, it did not come up to the experience of the assurable clergy who, for actuarial purposes, were a select class, having a certain income, living moral lives, and with not very much care or anxiety. If it were possible to divide the clergy into two sections, abstainers and non-abstainers, they might possibly show even as startling results as were given in the paper. They had not the means of doing that; but what they had before them, which he thought had been absolutely proved by the figures, was that in the class of people that were insured by the United Kingdom Institution, the abstainers' mortality during the working years of life was a lighter mortality than the non-abstainers in that period, and to a very considerable extent. Finally he wished to say that the Institution whose experience was before them had done a good and noble work in the cause of temperance. It was founded at a time when the teetotaler was considered to be a crank, but the directors persistently held on to their principles, which were now proved to be correct—that the abstainers as a class were better and lived longer than the non-abstainers; they had on each occasion of their periodical investigations compared the deaths in the two classes, and on each occasion a very great advantage in the abstainers' class was shown. In now publishing their complete experience, they had broken down all possible opposition, and removed all doubts as to the value of their figures; and they had, in that way, done more service to the cause they had at heart than any amount of talking would do.

Mr. J. H. Barnes thought he might fairly express from the floor of the house the members' great appreciation of the services that had been rendered to the Institute by the presentation of the paper. It had helped to crystallize ideas that some members had held before, and he had no doubt they would now be able to understand the general bearing of the subject a great deal better than they had previously. He agreed with Mr. Manly that they should always look to see whether the ratio was based on the experience of two or four deaths out of 1,000, or whether they were dealing with a much larger number. Laws might be deduced, after constant experience, of large numbers of deaths in connection with large numbers of lives, but to attempt to deduce a law from an experience of two or four deaths out of 1,000 lives in a very short space of time was quite out of the question.

Mr. A. Barrand said that Mr. Manly had compared the mortality of the abstainers with the mortality of the clergy. He had no doubt Mr. Manly intended the members to see clearly that the two classes could not be properly compared at all, that in any proper comparison of results individuals of practically the same class must be compared; and he thought that one of the great merits of the paper was that the author had compared the mortality of abstainers and non-abstainers of practically the same class. A comparison between the members of the United Kingdom Institution and the clergy assured in the Clergy Mutual, was, of course, quite fallacious. They lived under entirely different conditions, and normally would experience quite a different rate of mortality. But the great advantage of the comparison made by the author was that two bodies of lives, not exactly equal, but sufficiently equal for the purpose, taken from precisely the same class, were compared, the only difference between them being that one class consisted of abstainers and the other of non-abstainers; and therefore the comparison was of very much greater value than if those conditions had not existed.

Mr. A. Levine reminded the members that there had been other investigations than those presented by the author into the difference of mortality between abstainers' and non-abstainers' sections. He noticed one of those investigations the other day in a report of the New Zealand Insurance Department; and there, somewhat to his surprise, it appeared that, on the whole, the mortality in the abstainers' section had not been any better than the mortality in the other section; and, if he was not mistaken, in the Canadian branch of an office which did a large business in Canada, the mortality experience of the abstainers had been on the whole rather worse than that of the non-abstainers.

Mr. Geo. King said he had a little hesitation in intervening in the discussion, because he had practically no settled convictions. If there was anything to give settled convictions in a case of the kind, he thought the author's very able paper would do so; but even now he did not feel absolutely convinced, because he thought that possibly, not to the fullest extent, but at any rate to a certain extent, they might be placing the cause for the effect, or the effect for the cause. He thought it was quite possible that those who were total abstainers were so because they were vigorous and active, and did not feel any necessity for stimulants, whereas those who were not total abstainers in the same class might perhaps not feel themselves quite equal in physique. He was very much interested in the class of transfers, and perhaps that might throw a little light on the points he had touched upon. He thought it would be very interesting to know the causes of death amongst the cases of transfer from abstainers to non-abstainers, because that would help to clear up the question. The transfers from the abstainers to the non-abstainers showed a rather heavier mortality than in the abstainers' class by itself. Was that because those transferees had taken alcohol, or was it not possible that they might have passed to the non-abstainers' class because they had found themselves not so strong and vigorous as they were, and now required a little stimulant? He thought that was a point that wanted further elucidation. Then he wished to say, further, that he thought the author had proved from the experience of his company that, on the average, abstinence from alcohol generally did not do any harm: it might do good: but it did not follow that in every particular case it would do the same. He did not think it should be necessarily assumed that because in the aggregate in the abstainers' class the lives were better than in the non-abstainers', that, therefore, none of the abstainers would be the better for, in moderation, a little alcohol. He merely threw out these ideas to show that, notwithstanding the very strong circumstantial evidence the author had brought forward, he did not think the case was proved right away to the hilt. His own experience in the matter of abstainers' sections had been rather peculiar. Mr. Levine had mentioned New Zealand. Mr. R. P. Hardy and himself had been for many years frequently consulted over the actuarial work of the New Zealand Government, and the matter of the two sections had, on various occasions, come prominently before them. The facts were that in five valuations the total abstainers obtained a better bonus on one occasion than the non-abstainers, on two occasions the total abstainers obtained a smaller bonus, and on two occasions the bonuses were equal. There was never, however, any very great difference between them. It was not due to the way of managing the departments, because the bonuses from general profits were divided among them as if they were one institution, but an investigation on each occasion was made into the profits from mortality, and it was profits from mortality alone that made the differences, whatever differences there were, in the bonuses. So that it could not be that more expenses were thrown on one than on the other, nor any other circumstances whatever, except that among the abstainers' section there was a somewhat larger proportion of endowment assurances, and there was not the same room for gain in the mortality in that class as there was among the whole-life policies. Further, Mr. Levine had spoken of Canada, and said that a similar result was produced there. He had had another total abstainers' section at the Cape of Good Hope. He there took out the experience of a small company over a number of years. The classes were kept absolutely distinct throughout that period, and the result was that, if they had adhered to keeping the departments separate, the abstainers would not have got much more than half the bonus of the non-abstainers. It was, therefore, very remarkable that while in the United Kingdom, according to the author's figures, total abstainers were a much better class, yet it would appear that alcohol in moderation did no harm in the Colonies.

Mr. R. P. Hardy enquired whether the difference at the Cape was due to a larger mortality of the abstainers?

Mr. King said that the rate of mortality, age for age, or taking groups of ages, was considerably larger among the abstainers than the non-abstainers.

Mr. Hardy enquired whether there were a large number of cases under observation.

Mr. King replied in the negative.* It was also only right to mention that the figures were, to a certain extent, influenced by the war. He had no means of ascertaining how many deaths in each section were caused by the war, but he did not see why non-abstainers were less likely to be killed in battle than abstainers.

Mr. D. C. Fraser said that Mr. King had thrown out the interesting suggestion that the superior vitality of abstainers might not be due simply to abstinence from alcohol, but to the fact that through greater vigour of constitution they were able to dispense with strong drink. He wished to point out that, for the purposes of business, it did not matter what the cause of the superior vitality was; there was the fact proved in the paper that abstainers did show a lower mortality. That was a new fact thrown into the arena of business which would have to be taken into account in the future. He wished to add his testimony to that of the previous speakers as to the absolute and unique importance of the paper. There had been a great controversy for many years as to whether total abstinence or moderate drinking was the better; and the paper, which contained all the canons of a scientific examination of the question, unmistakably showed that total abstinence produced the lighter mortality. Two bodies of lives were drawn from the same classes of the community, selected by the same directors for the same period of time, the only difference between the two bodies being the one fact of their relation to the drinking of intoxicants. It might be taken for granted that the non-abstainers had answered the description of moderate drinkers and were selected with great care, and, notwithstanding that, the total abstainers had shown a superior vitality. Mr. King had also referred to the experience of abstainers and non-abstainers in the Colonies. He wished to point out in that connection that in the Colonies the sentiment in regard to strong drink seemed to be entirely different from what it was in this country. He saw lately some figures published by the Statistician of New South Wales, probably the most eminent statistician in the Colonies, which showed that in Australia and New Zealand the average consumption of alcohol was only two-thirds of what it was in this country. It was very probable that the non-abstainers in Australia and New Zealand were superior to the non-abstainers in this country, on account of the lesser consumption of alcohol per head. He did not know the sentiment existing at the Cape of Good Hope; it might be the same as in Australia and New Zealand, but Mr. King had pointed out that the experience there was only a small one, and in small experiences they knew that the figures might run in very curious ways.

Mr. T. P. Whittaker, M.P., as a visitor, said he could not pretend to speak as an actuary, but he might be able to deal with one or two of the practical phases of the question as they came before him. When Mr. Hughes made his reference in his presidential address to the lack of information on the subject, it was a matter of considerable interest to the directors of his office, because for three or four years they had been talking in the office of getting out the figures, and at that time had progressed a considerable way with the work. Therefore he was glad of the indication that when Mr. Moore had got out his paper the Institute of Actuaries would be pleased to receive it. They determined at the very outset to give the Institute the whole of the facts and the complete figures, whatever they might turn out to be. Reference had been made to the fact that the experience showed a somewhat high mortality amongst the younger lives, but he thought it would be misleading for the purpose of the discussion to compare that mortality with the O^M. That was not the point to be considered; the mortality had to be compared in the two sections. If the mortality, high though it might be in the abstainers' section in young life, was compared with the general section, it would be found very much lower than the general section, where it was higher still. The reasons for that high mortality were special, and had to be sought, but the important point was that even there the abstainer came out very much better than the non-abstainer. The mortality ran rather high between the ages of 75 and 79, and he ventured to think the explanation given by the author was a sound one. If their contention that abstinence was conducive to long life was correct, it meant that the lives of somewhat weaker persons were prolonged who, if they had not been abstainers, would have died earlier, but obviously they were not the very best and the very strongest lives. The time came when they had to die, and they seemed to die between 75 and 79, but they were lives which, if they had not been abstainers, would have dropped out probably at 45, 50 and 55. It seemed to him that the important table in the paper was Table 13, which showed that the percentage of the temperance section to the general section indicated a gain of from 25 to 45 per-cent from 25 to 65 years of age, *i.e.*, in the working, active, valuable part of life. That was an important feature from the national point of view. Mr. Manly had referred to the general improvement which had taken place in the health of the population, and expected from that fact that the later mortality would show an improvement on the earlier, and it did. But the important point of Table 14 was not merely that it showed that the mortality was lighter in the later years, but that the improvement in the abstainers' section in the later years was much greater than the improvement of the general; showing that the improvement in mortality generally resulting from greater sanitary knowledge, education and medical experience, gave greater value still to the temperance life, and that, under the improved conditions, the temperance life improved more than the general life did. One cause for that was, that there was more teetotalism in it, *i.e.*, more life abstainers. In the early part of the experiences a very large proportion of the abstainers were men who, in early life, had not been abstainers. He did not mean that they had been heavy drinkers. People were under a great delusion if they imagined that teetotalers consisted of heavy drinkers who had had to abstain. That was not the case at all, but still they had not been abstainers in the early years. He was struck, as the papers from the proposers came through his hands, at the very large proportion of the temperance section who were life abstainers; and therefore the office was getting a fuller and more complete benefit of the abstinence. Another point was, that a great many of them were the sons of teetotalers; and he suggested that those two reasons accounted very largely for the fact that the improvement in the temperance section during recent years had been greater than in the general, and it supported the contention that abstinence did lead to longer life. There was a practice in existence which possibly tended to make the temperance experience less favourable than it ought to be, namely, as the author said, the tendency to take a somewhat doubtful life on more favourable terms if it was in the temperance section; it was probably thought sometimes that the total abstinence counterbalanced something which, in the general section, would make them write the assured up. He knew that a little blemish was likely to be passed over in some cases because the proposer was an abstainer. Obviously such cases put the temperance section at a slight disadvantage. One point affecting the transfers, which accounted for the large number found in the year 1900–1, was that up to that time the office depended upon the agents to get the declarations signed, but there were a number of abstainers who would not sign the declaration; they thought they were making a pledge, and they had an objection to doing anything of the kind. In that year the company rigidly insisted upon the signing of the declaration, and some of the men who were undoubted abstainers would not sign. The company stuck to its regulations, and that was an explanation of the fact that some of those who had gone out of the temperance section were still abstainers, and went out because they would not sign the declaration. Mr. King had suggested—which was rather a compliment to them—that abstainers were more vigorous and active, and were better lives. Probably he (Mr. Whittaker) knew more of the abstainers in the country than any man in the room, and he doubted if that were so. He doubted whether, apart from their abstinence, they were a particularly careful, healthy and strong lot. They were a restless, strenuous, active, and sometimes a contentious lot, especially in years gone by. Men who took up an unpopular stand in social life were necessarily of that stamp of mind, and he did not think that strenuous, worrying attitude of mind was necessarily conducive to health or longevity. It was the quiet, equable, steady man who allowed nothing to worry him, that lived. The teetotaler was a strenuous, conscientious, active, fighting, worrying, driving sort of fellow; and he was not at all sure that that was particularly conducive to longevity. He thought it was fair to say that, on the whole, teetotalers were about on an average with ordinary steady-going men. A large number of the proposers in the United Kingdom Office came before him, and he would defy anybody who saw them to say which was the abstainer and which was the non-abstainer, unless he had the record before him. They lived in the same towns, they worked at the same occupations, they had practically the same rate of income, they were precisely the same kind of people. They were not comparing them with the general population, but with the general body of the assured in their general section, and, as a rule, the latter were careful, provident, and thrifty people; and he ventured to say that his company obtained a particularly careful lot. The directors and nearly all the agents were abstainers; therefore they naturally worked amongst a class of men who either were abstainers, or very closely approximated to it. Another point was that, being abstainers, they were what people would call a little censorious, *i.e.*, particular about liquor-taking. They looked at that question much more strictly than a non-abstainer would, and he thought, therefore, that their non-abstainers were a particularly sober and careful body. Mr. King made some remarks in regard to the question of transfers, and hoped a little further information would be obtained on the subject. He thought his company would follow it up with a good deal of interest; but suggested that the main point now in connection with the discussion was that the transfers were so few in number that they practically made no difference to the figures. Reference had been made to the experience of the Colonies. Of course, he could speak with no authority or special knowledge there, but he had a strong impression that the difference was a financial one more often than one of mortality. Mr. King had stated that there was a difference of mortality also; but when one came to the question of endowments the mortality did not tell nearly so much. Whatever might be the case in the Colonies—and he suggested that the experience was small and comparatively short—the paper contained particulars of a fairly large experience extending over 60 years in this country, and the results were clear. Comparison had been made with the Clergy Mutual and the Equitable, but he thought it was perfectly clear that the people in the United Kingdom Office were not of the social class of the Clergy Mutual or the Equitable. The mortality in the temperance section approached very closely to that of the Clergy Mutual and of the old Equitable. The United Kingdom dealt with a small class of people; the paper stated that the average value of the policy was small. One-third of the policies last year were for £100. Small people necessarily had not the same opportunity of looking after their health as the bigger people; they did not live in as good dwellings; they had not the same leisure; they had frequently more worry; they had not the same opportunity of having medical attendance; they could not take a holiday in the same way as the better class people could, and it was not to be expected that they would come out with a mortality equal to that of the clergy, or of the wealthy people insured in the old Equitable. But if by adding to their ordinary conditions total abstinence, they could bring those people up to the standard of a class of people high above them in the social scale, they had accomplished a great deal.

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* Mr. King informs us that at the close of the period there were 865 policies in force in the abstainers' section, and 2,792 in the non-abstainers'.

Mr. R. P. Hardy asked, before intruding upon the meeting the few observations which occurred to him, to be allowed to premise that there were present many dear friends of his, in whose regard he hoped to continue to live, and he trusted they would not consider that any of the observations he might feel it his duty to make were in any way directed against the rules of life they, in the exercise of their own discretion, had adopted for their guidance. As the one who had been mainly responsible for the statements put into the mouth of the United Kingdom Institution for years past, he appealed to all present whether he had in any degree misrepresented the results which were laid so fully before them that evening. He was sure the members would desire to congratulate the author on having emerged from his unnecessarily modest retirement, and on having obeyed the injunction of the President by contributing such an important paper to the Transactions. He might even go further, and say he considered he was highly privileged that, through the instrumentality of the Institute, he was the means of communicating to the world an important series of authentic facts in aid of the solution of a social problem of indisputable gravity. Although the only function with which the Institute was directly concerned was that of the death-rate and its dependencies, namely, the rates of premium, the reserves, and individual profit-rights, the ethics of advanced States had regard to all preventible causes of the waste of the life and energies of the people, among which certainly stood the evident ravages made by alcohol, extending most unhappily to the hitherto exempt Continent of Europe. Hence arose the political question, whether Governments were justified in exercising any control over the liquor traffic, apart from police regulations as to order. Moreover, it was highly desirable, in the interests of both men and their dependent families, that the real effects upon the constitution and prospects of longevity resulting from a constant resort to the various artificial stimulants in common use as lenitives under the pressure induced by our modern civilization, should be dispassionately examined, and that, if any dangerous tendency in the habitual use of such were disclosed, mankind should be warned, so that their daily life could in that, as in other sanitary matters, be framed according to the best rules approved by physiology. Hitherto it had been impossible to secure that necessary philosophic review, and even many of those most anxious to arrive at the truth had been compelled to retreat from a controversy where the unguarded and unverified assertions of philanthropists usurped the place of argument. While even the views of medical experts, based as they were upon their own sanguine interpretation of the limited series of facts falling within their observation, were too often expressed in the most positive language; and further, sometimes stood at direct variance with each other. But to-night they were in a wholly different arena, and one more congenial to the discovery of truth. The appeal now made was neither to their religious principles nor to their feelings, nor to what some individuals might think best for mankind, but rather to a tribunal whose imperturbability would not be led astray by side-issues, and whose impartiality would regard only the weight of the testimony adduced. That tribunal was the body of actuaries there assembled, and the evidence put before that Court was certain numerical results unimpeachable in their origin, and marshalled in due scientific order. Dealing with the broad results, and passing over all the minor points, the members had before them the life record of two distinctly middle-class populations, and during the same period, similarly circumstanced as to race and climate, and as to occupations, and with the elements of time and number in sufficient proportions, the only distinction being that in the one there had been a rigid abstinence from alcoholic liquors, and in the other—though selected with especial care as to habits—the prevailing custom in the use of liquor had been followed. It was indisputable that, if both groups were similar in all respects, they would expect to find the same experience. But, as a fact, a very marked difference was observed, and one too great to be passed over.

It was clearly not accidental, for he noted nearly the same in his investigation in 1882, and they moreover could trace it, though not to the same extent, in the subordinate groupings of the present enquiry. In a word, a notable difference in favour of the mortality of the abstainers forced itself upon their notice wherever they turned. When seeking an explanation of those phenomena, it was, he contended, a valid induction to refer it to the single isolated point presenting itself in the schedules, namely, the sole and prominent distinguishing feature of the groups, or abstinence as generally understood—unless it could be shown that abstinence was merely a name for a combined series of sanitating virtues, effecting proportionate ends, of which it might be taken as one type. He asked the members to see how the case could be put, if technically dealt with. The question was, was abstinence an antecedent, or a single continued act of the will, operating directly, by controlling the immature disintegrating agencies that made for death, or indirectly by releasing a plurality of independent, conjoint, or concomitant forces that retarded the lethal influences when artificially accelerated by vicious custom, in addition to other beneficial results? Or, was it a mere consequent, admittedly a halo upon the individual, but yet only a part of the moral outgrowth of the higher elements of character, congenital or acquired, that promoted the survival of the fittest? The first was the view taken by all persons who had had to deal with those pitiable cases of alcoholic derangement, and also by many medical experts, who having profoundly studied the physiological effects of alcohol, declared that it enfeebled the will and impaired the judgment. The second practically amounted to asserting that abstainers were merely amiable enthusiasts, deluding themselves, and, as Mandeville would have put it, throwing away good liquor for the empty vanity of self-denial. Speaking for himself, the present and other evidence, when reviewed in all its bearings, did not support the last view. In his long observation he had found that abstinence was a great deal more than that—that it stood *per se* amongst human efforts for the mastery of natural malefic impulses—that it was a *primum mobile*, an active energizing principle, originating and sustaining, not subsidiary to nor equipollent with any other inducing virtues. A recent endeavour had been made by one of the members to deny the *primâ facie* explanation of the experience, a sample of the dangerous position which was sometimes taken up at the bar, of admitting the facts and denying the inference. The case was half given away when the facts were admitted. They referred it to mere physical strength, such, as it was said—he did not say it—distinguished all persons of high self-control, and which would assert its superiority under all circumstances, here or at the North Pole, in temptation or out of it, or anywhere. To that he replied that no proof, not even the semblance of a proof, had been tendered that the starting point and maintaining power of abstinence was superior physical strength, and that, until an experience had been tabulated under that classification, the argument was an unbased assertion, and could not be opposed to one drawn from such an analysis as had been presented. It was not mere brute force, but that higher moral strength, induced by intelligently directed habits, which enabled men to neutralize the evils by which they were surrounded, and to emerge triumphant. The contrary doctrine was undiluted materialism. If the experience was examined in its age incidence it would be seen how effective an armour those habits of life had proved in the day of trial to those who had so wisely equipped themselves. Those habits, from early manhood down to approaching age, had continuously repelled the assaults of long hours, of unwholesome conditions of labour, and of the wear and tear inseparable from the lower grades of commercial life—life not conducted under such pleasant circumstances as actuaries, happily, lived in. It had been found that where the strain was greatest, there the principles told—the bow bent, but did not break. In conclusion, he was not without hopes that the facts laid before the Institute in the paper, though perhaps not complete in the impossible proof that technical logic demanded, might yet arrest their attention, and so far convey to their minds a strong impression of the highly probable truth of the conclusions advanced. It was not too much to say that the members' approval, and even their generous countenance would vastly strengthen the efforts of those devoted men who, having renounced what were to most the chief pleasures of this world, with apostolic zeal, consecrated their lives to strengthening the weak, to upholding the trembling, and to recalling the outcast.

The PRESIDENT (Mr. William Hughes) thought the paper was doubly welcome; firstly, because it introduced the Institute to a new contributor to their transactions, and he hoped it would not be the last time they would have contributions from Mr. Moore. The paper was also welcome as throwing a new light upon what had hitherto been a somewhat obscure subject. The absence until now of any precise information of the kind now disclosed, and the reluctance which had hitherto appeared to prevail amongst conductors of insurance companies which had temperance sections to give any detailed and explicit information as to their methods and their figures, had naturally induced suspicion that the temperance sections were being unduly favoured in some way. In fact, to use the author's expressive word, they were being "nursed." The members now had the opportunity, for the first time, of forming for themselves a judgment on a great many points upon which they had been till now in the dark; and especially it must be very gratifying to them to find that their suspicions—at all events, as far as the institution with which Mr. Moore was connected—had no foundation. But he thought they ought to be very careful as to the general deductions made from the facts put forward. Those facts would repay a great deal of study. No doubt the figures were capable of other explanations than those which would be sought to be put upon them. Enthusiastic temperance advocates would say that the favourable comparison between the two sections was entirely due to abstinence from alcohol. He wished to say that the paper, whatever it proved, did not prove that. The conclusions at which the author had arrived had been stated by him with studied moderation, and fell very far short of proving that total abstinence in itself was conducive to a long life. Of course there were a great number of people who hoped, when they knew the paper was going to be produced, that it would conclusively prove that fact, and he feared there were some people who would say it did prove it, and thereby they would do some injury to their own cause. Many a good cause had been quite as much damaged by injudicious advocacy as it had been by the open attacks of its enemies; and he wished to say to all those who desired to use the paper and discussion for that purpose to be very careful they did not overdo it. He thought one explanation had been indicated by one of the speakers. Mr. Whittaker had given them a portrait from life of the average teetotaler. It was not a pleasant one. He (the President) would not have dared to have painted the gentleman in such gloomy colours. According to what Mr. Whittaker had said, he would appear to be a very disagreeable person. He was quite sure he was not so bad as Mr. Whittaker painted him, but he would prefer to say that teetotalers were only a section of that part of the community which took particularly good care of themselves in every way. They were the people who always "wrapped up", and were careful not to expose themselves to any sort of influence that might injure their health or tend to shorten their life; they were not addicted to any vices, or to any of those customs and habits falling short of vices, which some careless people were addicted to; and he should say they were a careful-living and generally religious, God-fearing sort of people, and naturally would live a long life. In fact, they conducted life upon a principle exactly the contrary to that expressed by the formula too often adopted by others—"A short life and a merry one." In conclusion, he wished to propose a hearty vote of thanks to Mr. Moore for his most able paper.

The motion having been carried,

Mr. Moore, in reply, thanked the members very much for the kind way in which the paper had been received. He was well aware that the interest attached more to the materials used in it than the treatment. It had been his endeavour to state the facts impartially. It was simply for him to show what differences arose, and not what the causes of the differences were. He had to deal with two bodies of people, the only distinction between them, as far as his company could ascertain, being that the one body were teetotalers and the other not, and the figures showed the respective rates of mortality. Most of the points which had been raised in the discussion had been answered by other speakers, mainly by Mr. Whittaker. One was the comparison with the Clergy Mutual and the Equitable. He might point out that the average sum assured in the Clergy Mutual was £750, and in the Equitable £1,200, while in the United Kingdom Temperance it was under £300. He thought if they could show, with a much humbler class of people, that the addition of the practice of total abstinence would bring about as favourable a rate of mortality as that among the clergy and the well-to-do people assured in the Equitable, it was a very satisfactory state of affairs. In reply to Mr. Manly's remarks about ratios, personally he would not look at ratios without looking at the figures on which the ratios were based. He had stated the figures on which the ratios were based, so that they could see what the value of the ratios were. Mr. King had spoken of the mortality in New Zealand and at the Cape. He did not know what explanation could be offered, except that there appeared to be a great deal of fluctuation, which would naturally suggest small figures; in addition to which there were a larger number of endowment assurances in the temperance section. He again thanked the members very much indeed.

CORRESPONDENCE.

MORTALITY OF ABSTAINERS AND NON-ABSTAINERS.

[We have much pleasure in finding space for the following letters which have been addressed to us.—Ed. *J.I.A.*]

To the Editor of the Journal of the Institute of Actuaries.

Sir,—In the discussion which followed the reading of Mr. Moore's Paper on this subject it was pointed out by several speakers that, in order to obtain a true comparison between the rate of mortality amongst abstainers and non-abstainers respectively, it was essential that the lives brought under observation in the two classes should be similar in all other respects; and it was generally considered that Mr. Moore had been fortunate in obtaining data which possessed this necessary qualification. Had time permitted it was my intention to point out one respect in which the abstainers' experience differed from the non-abstainers' in a sense favourable to the former.

Mr. Moore's tables appear to me to contain ample internal evidence that the new business in the abstainers' section has been increasing very considerably in proportion to the new business in the non-abstainers' section.

I. On reference to the footnote to Table XV, it will be seen that during the period of 19 years from 31 December 1882 to 31 December 1901, the number of policies in force in the abstainers' section *increased* by about 29 per-cent, while the number of policies in the non-abstainers' section *decreased* by about 23 per-cent. In fact, while the total number in the two sections remained nearly the same, the numbers in the separate sections practically changed places.

II. On reference to Tables III and IV it will be seen that the policies "existing" at the close of the observations represent 43·5 per-cent of the entrants in the abstainers' section, but only 29·5 per-cent of the entrants in the non-abstainers' section.

III. On reference to the same tables it will be seen that the average number of years of exposure per new policy entering was 13·7 in the abstainers' section and 14·7 in the non-abstainers' section; while from Table V it appears that, if the first five years of assurance be excluded, the figures are 10·0 and 10·7 respectively. *Cæteris paribus*, the difference might have been expected to be in the reverse direction in view of the lower average entry-age and the lower rate of discontinuance in the abstainers' section.

If the explanation of these figures be, as I have suggested, that the proportionate amount of new business in the abstainers' section has increased, the result must be that in two senses of the word the abstainers' experience is somewhat "newer" than the non-abstainers. That is to say—

I. On the average the exposures must refer to a *later period* of time in the abstainers' section than in the non-abstainers', and there is clear evidence (both in Mr. Moore's paper and in the recent O^{M} experience) that the rate of mortality is improving as time goes on.

II. On the average the exposures in the abstainers' section must relate to *more recently selected lives* than those in the non-abstainers' section. This point is not entirely met by Mr. Moore's Table V in which the experience of the first five years from entry is excluded, because it is now generally recognised that the effect of selection is felt for a very much longer period.

It will be observed that whatever effect these differences might have, would be in the direction of exaggerating the divergence between the two sections.

I do not, however, suggest that these considerations would have sufficient effect in this case to seriously alter Mr. Moore's percentages, or the deductions which he draws from them. I refer to them rather as showing (on the point of statistical method) that it is not necessarily sufficient "that the same method and period be used for both sections" since this does not exclude differences, which, in certain circumstances, might be important.

I am, Sir, your obedient Servant,

G. J. LIDSTONE.

1, *Bartholomew Lane*, 30 *November* 1903.

To the Editor of the Journal of the Institute of Actuaries.

SIR,—Replying to Mr. Lidstone's letter of 30 November, the principle involved in his criticism of my paper must be admitted; but I submit that its bearing on the relative mortality of the abstainers and non-abstainers amounts to very little. Indeed, Mr. Lidstone is good enough to admit this in the last paragraph of his letter. If we compare the rates of mortality of the whole-life policies, healthy males, to the end of 1882, when the relative positions of the abstainers' and non-abstainers' sections were practically the reverse of those at the end of 1901, we have the following results:—

Percentage the Abstainers' Rate of Mortality is of the Non-Abstainers' Rate.

Ages (1)	To end of 1882 (2)	To end of 1901 (3)
20–24	89·5	69·9
25–29	75·5	70·1
30–34	59·6	56·5
35–39	58·1	54·8
40–44	58·8	57·2
45–49	64·1	58·5
50–54	61·6	62·4
55–59	65·2	70·6
60–64	81·7	78·5
65–69	82·1	84·0
70–74	85·7	86·5
75–79	88·6	110·0
80–84	74·9	93·7

I contend that the figures in column (2) support my general conclusions equally with those in column (3).

Some light is thrown on the effect of "selection" in my Tables V to VIII. Moreover, it does not necessarily follow that the selection operates in the same manner in each section. If we omit the first five years of assurance, the superiority of the abstainers' life is rather more evident than in the total experience, as is here shown:—

Percentage the Abstainers' Rate of Mortality is of the Non-Abstainers' Rate, Whole-Life Healthy Males, 1841–1901.

Ages	Total Experience	Excluding first five years of Assurance.
20–24	69·9	45·8
25–29	70·1	58·2
30–34	56·5	51·7
35–39	54·8	52·7
40–44	57·2	55·8
45–49	58·5	55·9
50–54	62·4	60·7
55–59	70·6	69·4
60–64	78·5	76·1
65–69	84·0	83·4
70–74	86·5	86·4
75–79	110·0	109·5
80–84	93·7	93·7

We might be justified in assuming from these figures that if "selection" could be entirely eliminated, the abstainers would come out better still.

I am, Sir, your obedient Servant,

R. M. MOORE.

1, *Adelaide Place, E.C.*, 14 *December*, 1903.

To the Editor of the Journal of the Institute of Actuaries.

SIR,—The object of my letter of 30 November was to call attention to a question of principle, which, as it seemed to me, was in some danger of being overlooked, and I am glad to note that in principle Mr. Moore and I are in agreement. I was, however, careful to disclaim any intention of discussing the quantitative effect of the considerations to which I alluded, and I do not now propose to enter into any such discussion, for which the published data appear to be inadequate.

I should like, however, to suggest to Mr. Moore that, as his paper is likely (for a long time to come) to be the standard source of information on the subject, it would be very desirable to add to his tables a statement giving, for quinquennial periods, the relative numbers of new entrants in the two sections; thus showing clearly the different rates of progression.

Mr. Moore's remarks as to the relative effect of selection in the abstainers' and non-abstainers' experience are very interesting, and encourage the hope that as he is in possession of a unique body of facts he may see his way, at no remote time, to analyze the data according to the duration of assurance. By this means he would not only obtain the most scientific comparison between the rates of mortality in the two sections, but would also secure the means of investigating whether the effect of selection differs in the two sections as he suggests.

In the case of assurance statistics it is hardly possible to *eliminate* the effect of selection, but what I understand Mr. Moore to suggest is that as the duration of the assurance increases the effect of selection may wear out more rapidly in the case of the non-abstainers than in the case of the abstainers. This hypothesis is certainly consistent with the percentages given in the second table of Mr. Moore's letter, and it offers an interesting subject for further investigation. It may be worth while to point out that if the hypothesis be correct the effect will be to increase and not to diminish the disturbing effect of the differences of duration to which I called attention in my previous letter.

I am, Sir, your obedient Servant,

G. J. LIDSTONE.

1, *Bartholomew Lane, E.C.*, 21 *December*, 1903.

To the Editor of the Journal of the Institute of Actuaries.

Sir,—I regret that owing to pressure of other business I am unable at present to furnish the relative numbers of new entrants quinquennially in the Temperance and General Sections. To do so would involve a very extensive re-sorting and counting of the cards. I hope, however, in a few months to go more closely into the question of "selection" by an analysis of the data, as suggested by Mr. Lidstone.

I did not intend to imply in my letter of 14th inst. that selection may wear out more rapidly in the case of non-abstainers, nor have I any reason to believe that this is so, except that "Abstinence" is an element of selection with the Abstainers, and this always remains with them; in other words, never "wears out." But the other elements are the same in both sections, so far as we know.

Broadly, the aggregate experience shows a certain superiority of the abstainers over the non-abstainers. If we exclude the experience of the first five years of assurance, this superiority is even more evident. At present we have no material to show that either section would show relatively better or worse results if we excluded the first seven or ten years of assurance, but I hope to make this clear shortly.

I am, Sir, your obedient Servant,

R. M. MOORE.

1, *Adelaide Place, E.C.*, 29 *December*, 1903.

ALCOHOLIC BEVERAGES AND LONGEVITY.

BY

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AND GENERAL PROVIDENT INSTITUTION.

(REPRINTED BY KIND PERMISSION FROM THE
"CONTEMPORARY REVIEW" FOR MARCH 1904.)

PRINTED BY
HAZELL, WATSON AND VINEY, LD.,
LONDON AND AYLESBURY.

ALCOHOLIC BEVERAGES AND LONGEVITY.

During the second quarter of last century—in 1839 and 1847—two important declarations, signed by the leading physicians of the time, stated that "the most perfect health is compatible with total abstinence from all intoxicating beverages," and "total and universal abstinence from alcoholic liquors and beverages of all sorts would greatly contribute to the health of the human race." But definite and precisely recorded experience, covering a long period and embracing a large number of persons, was not available in those days. In course of time, however, it became perfectly clear to competent observers that Abstainers were quite as healthy and lived as long as Non-Abstainers, and the argument in favour of abstinence, based on the contention that no article could be a benefit if it were no loss to be deprived of it, became a very forcible one. Nevertheless, if the declaration of the physicians of sixty years ago was to be completely confirmed and justified, it had to be demonstrated, not only that alcoholic beverages were not necessary to health, but also that abstinence from them was beneficial. For that purpose definite, widespread, prolonged and carefully recorded experience of the comparative mortality of Abstainers and Non-Abstainers was required. It has been gradually accumulated during the past sixty years, and is now available. The requisite volume of experience, having regard to the length of time over which it extends, the number of individual cases which it comprises, and the fulness and accuracy with which it has been recorded, can, it is believed, be furnished nowhere else than by the Institution whose statistics are now presented in this article, which is the substance of a paper (with two added paragraphs) which was read recently before the Life Assurance Medical Officers' Association.

The United Kingdom Temperance and General Provident Institution was founded in 1840, in order to assure only the lives of persons who were Total Abstainers from the use of intoxicating liquors as beverages. A few years later Non-Abstainers were admitted. The first policy was issued in January 1841, and throughout the whole period, from that date down to the present time, a complete record has been kept of the lives at risk and the mortality experienced in the Temperance and General Sections, as the two departments have been designated.

It will simplify the consideration of the whole subject if it be examined in two stages. First, Do Abstainers live longer than Non-Abstainers? Second, If Abstainers do live longer, is their lower mortality due to their abstinence?

Between 1841 and 1901 some 125,000 policies of all kinds were issued by the Institution. This article will, however, deal almost exclusively with the whole-life policies on healthy male lives—that is to say, policies which were payable only on the death of the assured, and were issued at ordinary rates on the lives of men who were in sound health at the time of assurance. Of these there were in the General or Non-Abstaining Section 31,776. They passed through 466,943 years of life, and amongst them there were 8,947 deaths. In the Temperance or Abstaining Section there were 29,094 policies, passing through 398,010 years of life, with 5,124 deaths.

We have, therefore, spread over sixty-one years, a large volume of experience, with about 30,000 policies in each section, representing a total of nearly 865,000 years of life, and more than 14,000 deaths.

My esteemed colleague, Mr. R. M. Moore, the Actuary of the Institution, has recently tabulated in much detail and with great care the results of that experience, and to him I am indebted for the tables which are herein presented.

It will be convenient at this stage to state that the persons admitted to the Temperance Section of the Institution do not take alcoholic liquors as beverages. They are required to make a declaration of continued abstinence every year. If one who is assured in the Temperance Section cease to abstain, he is transferred to the General Section; and policy-holders in the General Section who become abstainers are usually eligible for transfer to the Temperance Section. These transfers are not made if the assured be known to be in bad health, or be over seventy years of age; but the Non-Abstainers' rate of bonus is allotted.

In the tables used in this article, policies which have been transferred to a section are not included in the policies of that section. Consequently the tables give for each section the result of the experience of those policies which were originally entered in it and for the time which they remained in it. It is submitted that this method provides the most useful material for accurate comparison.

The following tables show the rate of mortality which has been experienced in each of the two sections:—

HEALTHY MALES—WHOLE-LIFE POLICIES—1841—1901.

Ages.	NON-ABSTAINERS.			ABSTAINERS.		
	Exposed to Risk.*	Died.	Rate of Mortality per cent. per annum.	Exposed to Risk.*	Died.	Rate of Mortality per cent. per annum.
0—19	2,768	11	·397	5,619	33	·587
20—24	9,516	63	·662	15,760	73	·463
25—29	27,099	157	·579	32,740	133	·406
30—34	46,965	339	·722	46,555	190	·408
35—39	61,106	495	·810	54,097	240	·444
40—44	67,423	645	·957	55,604	304	·547
45—49	65,931	846	1·283	51,377	385	·749
50—54	58,941	992	1·683	44,138	463	1·049
55—59	47,879	1,136	2·373	34,974	585	1·673
60—64	35,161	1,148	3·265	25,263	648	2·565
65—69	23,219	1,176	5·065	16,479	702	4·260
70—74	12,857	922	7·171	9,325	578	6·199
75—79	5,780	614	10·623	4,351	505	11·607
80—84	1,890	307	16·252	1,346	205	15·230
85—89	358	79	22·607	322	66	20·497
90—94	49	16	32·653	55	14	25,455
95—99	1	1	100·000	5	...	...
All Ages.	466,943	8,947	...	398,010	5,124	...

* *See* Supplementary Notes.

Bringing the mortality rates of the two sections together, we may compare them thus:—

ABSTAINERS AND NON-ABSTAINERS COMPARED.

HEALTHY MALES—WHOLE-LIFE POLICIES—1841–1901.

Ages.	Rate of Mortality per cent. per annum. Abstainers' Experience.	Rate of Mortality per cent. per annum. Non-Abstainers' Experience.	Taking Non-Abstainers' Experience as 100, Abstainers' Experience is :
0—19	·587	·397	148·0
20—24	·463	·662	69·9
25—29	·406	·579	70·1
30—34	·408	·722	56·5
35—39	·444	·810	54·8
40—44	·547	·957	57·2
45—49	·749	1·283	58·5
50—54	1·049	1·683	62·4
55—59	1·673	2·373	70·6
60—64	2·565	3·265	78·5
65—69	4·260	5·065	84·0
70—74	6·199	7·171	86·5
75—79	11·607	10·623	110·0
80—84	15·230	16·252	93·7
85—89	20·497	22·607	90·7
90—94	25·455	32·653	77·9

Comparing the two sections, it will be seen that, taking the table as a a whole, the mortality in the Temperance Section was much lower than in the General Section. Up to 20 years of age the rate of mortality was lower in the General than in the Temperance Section. But as there were only 44 deaths in the two departments, between the ages of 10 and 20 years, over a period of sixty-one years, the material is somewhat meagre, and an increase or decrease of very few deaths in either department would entirely alter the relative percentages. Further, the mortality figures for those years can have little or no bearing on the question which is now being considered, inasmuch as a large number of the young men under 20 in the General Section are practically abstainers, and when that is not so their use of intoxicants is not such as would cause their death at so early a period in their lives.*

From ages 20 to 74 the mortality among the Abstainers is very considerably lower than among the Non-Abstainers. From 75 to 79 it is higher among the Abstainers. The obvious explanation of that is that the lower mortality experienced among the Abstainers during the previous fifty years carried into advanced age a large number of lives, not of the strongest and most vigorous type, which would have dropped out much earlier if they had been Non-Abstainers. The survivors of the heavier mortality of the Non-Abstainers were the most vigorous and careful of them, and it is not surprising that when the allotted course of human life had been run they should show a somewhat lower percentage of mortality than the Abstainers, who had among them a substantial portion of the weaker ones whose existence had been prolonged.

When those weaker ones had been, so to speak, weeded out, the superior mortality of the Abstainers again asserted itself. It may be pointed out here, that out of a given number of Abstainers and Non-Abstainers at any age, a much larger number of Abstainers live to 70, 80, and 90 years.

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* *See also* Supplementary Notes.

The point is the same as the one which is illustrated in the Life Tables of the Registrar-General, which show that from age 27 onwards the expectation of life amongst males was greater in 1838–54 than in 1881–90. The number of persons alive, out of a given number born, was greater in 1881–90 up to 79 years of age, but after 26 years of age the death rate was heavier, because the improved sanitary conditions, etc., had prolonged weaker lives which, under the previous less favourable surroundings, would have dropped out much earlier.

Taking the mortality of the Abstainers and the Non-Abstainers as a whole, from ages 10 to 95, the superior mortality of the Abstainers is very marked. The total number of deaths in the Temperance Section was 5,124. Had the mortality in that section been at the same rate as in the General Section, the deaths would have been 6,959 or, 1,835 more than they really were. That is to say, the mortality in the General Section was, on the average, 36 per cent. higher than in the Temperance Section.

It may be suggested that the question of the transfers is vitally important, inasmuch as if persons in weak health, who have commenced to take alcohol because they are weak, are transferred from the Temperance to the General Section and die there, there can be no wonder that the death rate is higher in the General than in the Temperance Section. It will be well to dispose of that suggestion now. The simple fact is that the number of transfers has been so small that they do not produce any material result upon the main body of the tables. Up to

1899 the number of transfers from the Temperance to the General Section was 1,662, or an average of 31 per annum; the transfers from the General to the Temperance Section during the same period were 1,404, or an average of 26 per annum: that is to say, during nearly sixty years the total transfers from one section to another were only about 5 per cent. of the total number of persons assured.

The following tables conclusively demonstrate that, whether the transfers to or from either section be included in the section or excluded from it, no material difference is made in the mortality rate. Differences of opinion may exist as to how transfers ought to be treated statistically. These tables show that each person may treat them as he pleases, and the result in any case will practically be the same:—

RATES OF MORTALITY PER CENT. PER ANNUM.

Ages.	Non-Abstainers.			Abstainers.		
	Transfers to Non-Abstainers combined with Non-Abstainers.	Transfers to Abstainers combined with Non-Abstainers.	Normal Rate of Non-Abstainers without Transfers.	Transfers to Abstainers combined with Abstainers.	Transfers to Non-Abstainers combined with Abstainers.	Normal Rate of Abstainers without Transfers.
10—14	·168	·169	·170	·190	·189	·190
15—19	·467	·470	·475	·665	·663	·668
20—24	·680	·664	·662	·466	·479	·463
25—29	·576	·581	·579	·410	·410	·406
30—34	·719	·712	·722	·404	·421	·408
35—39	·817	·797	·810	·440	·472	·444
40—44	·962	·939	·957	·542	·578	·547
45—49	1·301	1·269	1·283	·760	·806	·749
50—54	1·674	1·645	1·683	1·041	1·079	1·049
55—59	2·423	2·326	2·373	1·666	1·787	1·673
60—64	3·259	3·220	3·265	2·568	2·605	2·565
65—69	5·147	5·015	5·065	4·267	4·428	4·260
70—74	7·186	7·102	7·171	6·193	6·280	6·199
75—79	10·527	10·476	10·623	11·347	11·424	11·607
80—84	16·599	16·050	16·252	15·062	15·771	15·230
85—89	21·658	21·550	22·607	20·029	20·116	20·497
90—94	32·075	35·294	32·653	28·070	25·423	25·455

The tables given thus far cover the whole time the policies were in the respective sections, from the day they were issued. A more useful comparison for the purposes of this article will, however, be obtained by excluding, in all cases, the first five years of Assurance. Roughly speaking, the effect of medical selection largely disappears in five years. Consequently, by omitting the first five years of Assurance from our observations, we practically exclude any advantage which might accrue to one of the sections, if there were in it a large number of recent assurances—that is, more recently selected lives—than in the other.

MORTALITY EXCLUDING FIRST FIVE YEARS OF ASSURANCE.

Healthy Males—Whole-Life Policies—1846–1901.

Ages.	Abstainers.			Non-Abstainers.		
	Exposed to Risk.	Died.	Rate of Mortality per cent. per annum.	Exposed to Risk.	Died.	Rate of Mortality per cent. per annum.
0—24	4,512	22	·488	2,013	17	·845
25—29	12,138	66	·544	6,418	60	·935
30—34	25,756	118	·458	20,210	179	·886
35—39	37,153	178	·479	36,526	332	·909
40—44	43,061	250	·581	48,679	507	1·042
45—49	42,734	335	·784	53,489	750	1·402
50—54	38,728	412	1·064	51,426	902	1·754
55—59	32,234	542	1·682	43,918	1,065	2·425
60—64	24,002	617	2·571	33,390	1,128	3·378
65—69	16,049	684	4·262	22,475	1,148	5·108
70—74	9,234	578	6·260	12,607	914	7·250
75—79	4,317	503	11·652	5,745	611	10·635
80—84	1,324	203	15·327	1,880	307	16·334
85—89	322	66	20·497	356	78	21·910
90—94	55	14	25·455	49	16	32·653
95—99	5	...	...	1	1	100·000
All Ages.	291,624	4,588	...	339,182	8,015	...

Bringing the rates of mortality in the two sections together, as before, we get the following comparison:—

ABSTAINERS AND NON-ABSTAINERS COMPARED.

EXCLUDING FIRST FIVE YEARS OF ASSURANCE.

Ages.	ABSTAINERS.	NON-ABSTAINERS.	Taking Non-Abstainers' Experience as 100, Abstainers' Experience is:—
	Rate of Mortality per cent. per annum.	Rate of Mortality per cent. per annum.	
0—24	·488	·845 173	57·8
25—29	·544	·935 172	58·2
30—34	·458	·886 194	51·7
35—39	·479	·909 190	52·7
40—44	·581	1·042	55·8
45—49	·784	1·402 - 179	55·9
50—54	1·064	1·754 — 165	60·7
55—59	1·682	2·425 — 145	69·4
60—64	2·571	3·378 — 132	76·1
65—69	4·262	5·108 — 120	83·4
70—74	6·260	7·250 116	86·4
75—79	11·652	10·635 91	109·5
80—84	15·327	16·334 — 107	93·7
85—89	20·497	21·910 — 10[illegible]	93·6
90—94	25·455	32·653 — 128	78·0

It will be observed that during the strenuous working years of manhood, from twenty-five to sixty years of age, the annual mortality rates among Abstainers were, on the average, 40 per cent. lower than among the Non-Abstainers. That is an enormous difference.

It must be admitted that these tables prove that, so far as the lives assured in the United Kingdom Temperance and General Provident Institution are concerned, the Abstainers, age for age, show a much lower rate of mortality than the Non-Abstainers. But the question may be asked—are the Non-Abstainers assured in that

Institution good average assurable lives? Are they as sober, as healthy, and as long-lived as the average of those lives which are assured in the other Life Offices whose mortality experience furnishes the data upon which the Life Assurance business of the country is conducted? The two standard Life Assurance tables of recent years are those which are known as the H^M and the O^M. The H^M tables show the mortality experience of the principal Life Offices of Great Britain among healthy males up to the year 1863. The O^M tables show the experience of a larger number of offices for the years 1863–93. The O^M experience covers a period of better sanitary and economic conditions than those which prevailed during the time covered by the H^M tables, and it shows a somewhat lower rate of mortality. As the experience of the United Kingdom Temperance and General Provident Institution covers the years 1841–1901, it does not quite coincide with that of either of the two standard tables. Probably the mean of the two would be a fair comparison. It will, however, perhaps be best to compare the mortality in the Temperance and General Sections of the Institution respectively with that of both the H^M and O^M tables.

That is done in the table which follows, and it will be seen that the figures show that the total mortality in the General Section was about 5½ per cent. less than was to be expected according to the H^M table, less than ½ per cent. more than the expectation according to the O^M table, and 2½ per cent. less than the mean of the two standard tables. Practically the mortality was that of the O^M table. It is clear, then, that the General Section consists of good average assured lives, and that the mortality in it is equal to that of the average Life Offices of the country on whose experience the standard Life Assurance tables are based.

The mortality of the Temperance Section was not only very strikingly lower than that of the General Section in the Institution, but it was much lower than that of the average of assured lives in other offices as shown by the H^M and O^M tables. Taken as a whole, over the period of sixty-one years, it was 30 per cent. lower than that shown by the H^M table, and 25 per cent. lower than that shown by the O^M table.

ACTUAL AND EXPECTED DEATHS COMPARED.

Ages.	Non-Abstainers.			Abstainers.		
	Died.	Expected Deaths by :		Died.	Expected Deaths by :	
		H^M Table.	O^M Table.		H^M Table.	O^M Table.
10—14	1	2	2	3	3	4
15—19	10	8	8	30	17	17
20—24	63	65	41	73	108	68
25—29	157	187	142	133	226	171
30—34	339	381	304	190	377	302
35—39	495	578	491	240	512	435
40—44	645	724	675	304	597	557
45—49	846	903	842	385	704	656
50—54	992	1,034	998	463	775	747
55—59	1,136	1,149	1,119	585	839	818
60—64	1,148	1,218	1,176	648	875	845
65—69	1,176	1,159	1,138	702	822	808
70—74	922	964	936	578	699	679
75—79	614	663	629	505	499	474
80—84	307	324	307	205	231	219
85—89	79	83	86	66	74	77
90—94	16	17	17	14	19	19
95—99	1	1	...	...	5	3
All Ages.	8,947	9,460	8,911	5,124	7,382	6,899

One more method of exhibiting the difference in the mortality under the various tables is by showing the number of survivors at succeeding ages out of a given number, say 100,000, alive at a specified age.

In the following tables T^{M} represent the ratio of survivors in the Temperance Section of the Institution:—

LIFE TABLE OF HEALTHY MALES, ABSTAINERS, WHOLE-LIFE POLICIES, 1841–1901 (T^{M}).

Showing out of 100,000 living at ages 20, 30, etc., the numbers surviving to the succeeding decennial ages according to T^{M}, O^{M}, and H^{M} tables respectively. Also the additional survivors by the T^{M} Table.

Age Attained.	Commencing Age, 20.				
	By T^{M}.	By O^{M}.	Additional Survivors by T^{M}.	By H^{M}.	Additional Survivors by T^{M}.
20	100,000	100,000	...	100,000	...
30	95,779	95,323	456	93,392	2,387
40	91,755	88,609	3,146	85,515	6,240
50	86,024	78,986	7,038	75,581	10,443
60	74,793	64,355	10,438	61,177	13,616
70	53,044	42,109	10,935	39,621	13,423
80	21,152	16,101	5,051	14,477	6,675
90	2,174	1,655	519	1,517	657
	Commencing Age, 30.				
30	100,000	100,000	...	100,000	...
40	95,799	92,959	2,840	91,565	4,234
50	89,815	82,863	6,952	80,928	8,887
60	78,089	67,513	10,576	65,506	12,583
70	55,382	44,175	11,207	42,424	12,958
80	22,084	16,891	5,193	15,501	6,583
90	2,269	1,736	533	1,625	644

Age Attained.	By T^M.	By O^M.	Additional Survivors by T^M.	By H^M.	Additional Survivors by T^M.
	COMMENCING AGE, 40.				
40	100,000	100,000	...	100,000	...
50	93,754	89,139	4,615	88,383	5,371
60	81,514	72,628	8,886	71,540	9,974
70	57,811	47,521	10,290	46,332	11,479
80	23,053	18,171	4,882	16,929	6,124
90	2,369	1,867	502	1,774	595
	COMMENCING AGE, 50.				
50	100,000	100,000	...	100,000	...
60	86,944	81,476	5,468	80,943	6,001
70	61,662	53,311	8,351	52,422	9,240
80	24,588	20,384	4,204	19,154	5,434
90	2,527	2,095	432	2,008	519
	COMMENCING AGE, 60.				
60	100,000	100,000	...	100,000	...
70	70,922	65,432	5,490	64,763	6,159
80	28,281	25,019	3,262	23,664	4,617
90	2,906	2,571	335	2,480	426

This table should be read thus:—Out of 100,000 living at age 30, 55,382 would survive to age 70 according to the Institution's Temperance Mortality Experience. But according to the O^M table only 44,175 would survive, and according to the H^M table the survivors would only number 42,424. As the Institution's Mortality Experience in the General Section is practically the same as the O^M, these figures mean that out of 100,000 persons alive at thirty years of age in the Temperance and General Sections respectively, something like

11,207 more Abstainers than Non-Abstainers would be alive at seventy years of age. The difference in favour of the Abstainers would be 5,193 at age 80, and 533 at age 90.

The effect of the lower mortality of the Abstainers might be further illustrated in various ways. For instance, the expectation of life at various ages of the persons in the two sections might be shown. It would be found that according to the O^{M} table the average expectation of life of an assured male aged 30 is 35·1 years. But the expectation of the Institution's Temperance lives of that age is 38·8 years, a difference of 3·7 years, or nearly 11 per cent.

Enough has been said to demonstrate—

1st. That the Abstainers assured in the Institution show a marked superiority in mortality, and especially through the active working years of life, over the Non-Abstainers assured in the Institution.

2nd. That the Non-Abstainers assured in the Institution are good average lives, equal to the latest and best accepted standard of assured life—the O^{M} table.

3rd. That, on the average, assured Abstainers have a lower mortality and do live longer than assured persons generally.

Thus far attention has been confined to the experience of the Institution as regards healthy lives—that is, the lives of men whose personal condition and family and personal history at the time of assurance justified their acceptance as good average lives at ordinary rates. There is, however, another class of policy-holders with reference to whom the experience of the Institution is interesting, and a passing reference to it may be made.

A certain proportion of persons are assured whose lives are described as "second class" and are "rated-up," because their personal or family history or their personal condition at the time of assurance is not thoroughly good, or they are engaged in an unhealthy occupation or reside in a more or less unhealthy climate. The usual course is to assume that such persons are some years older than they actually are and to charge them a higher premium accordingly. There have been and are a considerable number of these "rated-up" lives in both sections, and it is interesting to note that among these men, who are of more or less dubious family history or not quite robust personal physique, or who live or work under unfavourable conditions, the superiority of the Abstainers over the Non-Abstainers is considerably more marked than it has already been shown to be amongst those policy-holders who have been accepted at the ordinary rates. The indication of the experience of the Institution distinctly is that for persons whose constitution or family history or environment is not quite satisfactory, personal abstinence from the use of alcoholic liquors is exceptionally desirable and important. Whether the statistics of these "rated-up" lives be taken out on the basis of their actual ages or at the "rated-up" ages, the teaching of the figures is equally clear and striking. This reference to a special class of lives is, however, a digression from the main purpose of this article.

Returning to the consideration of the experience of those who were accepted as good healthy male lives, the next point to be discussed is: Is the superiority of the Abstainers due to the fact that they are Abstainers? On the face of the statistics it would seem clear that this is so. But it may be suggested that it has yet to be shown that the persons assured in the two sections are taken from the same social strata, and are similar in all other respects, except abstinence from the use of intoxicating liquors as beverages.

That the financial position of the policy-holders in the two sections is practically the same is indicated by the fact that the average amount assured by the whole-life with profit policies in force at the last quinquennial valuation was £299 in the Temperance Section and £321 in the General Section. As a matter of fact, those of us who are engaged in carrying on the business of the Institution know that the policy-holders in the respective sections are of similar social status and are engaged in the same occupations. They live in the same towns, often in the same streets, and have similar incomes. There is nothing whatever in their position, surroundings, condition, appearance or avocation that would enable the officials or medical advisers of the Institution, or any one else, to discriminate between the Abstainers and the Non-Abstainers until the persons concerned themselves stated what their habit and practice was. So far as it is possible for the most careful observers, after full opportunity and experience, to say, the people are precisely the same, in both sections, in all important and essential particulars, with the single exception that those in one section are Abstainers and those in the other section are Non-Abstainers.

It has, however, been suggested that Abstainers are particularly careful and methodical people, who live according to rote and rule, avoid risks, excitement, and excess of all kinds, and generally cultivate conditions which promote health and longevity; and that their abstinence from intoxicants is merely an indication of a class or type which affords a ready method of sorting them out, and is not the cause of their superior mortality, which is really due to their generally careful, quiet, methodical mode of life. It may be pointed out that if there were substance in this theory, it would be a striking fact that a body of people who, by so contriving their lives as to make them, on the average, considerably longer than those of their neighbours in similar occupations and social position, have given practical proof of their superior appreciation of the conditions of health, do eschew the use of alcoholic beverages and thereby present a substantial *prima-facie* case for abstinence.

There is, however, little foundation for the theory. It must be remembered that the comparison we are making is not between Abstainers and Non-Abstainers generally, but between assured Abstainers and assured Non-Abstainers. Assured persons are, as a whole, a thrifty and careful class. That they assure their lives is some evidence of that, especially amongst those from whom the Institution draws its policy-holders in a business which is almost exclusively provident as contrasted with financial. They also have to satisfy the assuring offices at the time of entry that they are persons of good character and lead abstemious and careful lives. The Non-abstaining policy-holders in the Institution are believed to be a particularly careful body of men. Proof of that is found in the fact that, with an average sum assured per policy smaller than that of the average of the Life Offices on whose experience the standard tables are based, the mortality amongst the Non-Abstainers in the Institution is not larger than that of the average of those offices. The explanation of that fact is: (1) that, the Institution being Temperance in origin and management, its agents and officials are very largely Abstainers, and they naturally move amongst and secure proposals from circles of acquaintances and connections, who, when they are not Abstainers, are likely to be very careful and moderate users of alcoholic liquors; and (2) the Directors and chief officials being Abstainers, they scrutinise with special care information as to the habits, surroundings and past history of Non-Abstainers, and are likely to be more strict than others in defining what can be admitted as moderation. It is very doubtful whether the Abstainers in the Institution live more careful lives in other respects than the Non-Abstainers. The Abstainer is frequently an active, pushing, worrying, tenacious man, and sometimes a contentious one. That was probably more the case years ago than it is now. Men who take an unpopular stand and set their faces against a general social custom are not usually of the calm, careful, contented stamp of mind which makes for peace, health and longevity. Indeed, it is probable that the particularly cautious and careful man is more often than not a Non-Abstainer. He persuades himself or is persuaded that a glass of wine or beer with his dinner and a little whiskey and water at night will do him good, and he figures in the Institution in the section which shows a markedly higher mortality than is experienced by those who deprive themselves of those " helps," " digestives," " stimulants," and " soothers."

It is submitted that there is no evidence to show that the superior longevity of the assured Abstainer is due to any other quality, condition, or characteristic than his abstinence. In all other respects he is similar to and cannot be distinguished from the assured Non-Abstainer. He is, apart from his abstinence, a fair average representative of the assured lives of the country and nothing more. No means of selecting him, no method of sorting out these exceptionally good lives and separating them from the ordinary assured lives—other than by the test of abstinence from the use of alcoholic beverages—can be suggested. That, and that alone, marks the difference—the only demonstrable, tangible, real difference there is.

As a matter of fact, if the statistics now presented place at a disadvantage either of the habits of life which the two sections represent, it is probably that of abstinence which suffers. In the first place, there are a number of people in the General Section who are either actually or for all practical purposes Abstainers. Some of them will not make the declaration which is required if they are to be in the Temperance Section, and others desire to be at liberty to take wine, beer or spirits on very exceptional occasions. On the other hand, many of the Abstainers in the Temperance Section have not always been Abstainers. They have not been "intemperate," but they have been among those moderate Non-Abstainers whose mortality is less favourable than that of Abstainers. They cannot present the full advantages of abstinence, as life Abstainers can. Lastly, I know that, as a matter of practice, there is a tendency in the Institution to accept lives rather more favourably in the Temperance than in the General Section. Slight flaws in the personal condition or family history of the proposer are apt to be regarded more leniently if he be an Abstainer. It is not suggested that any one of these points amounts to very much, but in the aggregate they must, to some extent, weight the balance to the disadvantage of Abstainers, if a strictly accurate comparison between Abstainers and Non-Abstainers be desired. Certainly they may be taken as a complete set-off, if set-off be thought to be required, against the suggestion that assured Abstainers lead more careful lives in other respects than assured Non-Abstainers. Personally I am convinced that if, on the one hand, all those who really or practically are Abstainers were taken out of the General Section, and, on the other, the Temperance Section consisted entirely of life Abstainers, the results would be more favourable to that section than they are now; and if those life Abstainers were all the children of Abstainers, I believe the comparison would be still more striking.

Another suggestion which may be referred to is that, as the mortality experience of the Clergy Mutual and the Equitable Life Assurance Societies, whose members are not required to be Abstainers, is quite as good as that of the Temperance Section of the Institution, it is clear that Abstinence is not the cause of the lower mortality of that section.

Before considering the point thus raised, it will be useful to set out the facts. The following table shows the expectation of life according to the experience of the Temperance Section of the Institution (T^{M}), together with that of the Clergy Mutual and the Equitable Life Assurance Societies, and of the O^{M} and H^{M} standard tables:—

EXPECTATION OF LIFE.

Age.	T^{M} 1841–1901.	Clergy Mutual General Experience, 1829–87.	Equitable, 1863–93.	O^{M} 1863–93.	H^{M} — 1863.
20	46·9	47·1	46·1	43·2	41·6
25	43·0	43·2	42·0	39·1	37·9
30	38·8	39·1	38·0	35·1	34·2
35	34·6	34·9	33·9	31·2	30·5
40	30·3	30·8	29·8	27·4	26·9
45	26·1	26·6	25·8	23·7	23·3
50	22·0	22·5	21·9	20·1	19·8
55	18·1	18·8	18·2	16·7	16·5
60	14·6	15·3	14·7	13·6	13·3
65	11·3	11·9	11·5	10·7	10·5
70	8·5	9·1	8·8	8·2	8·0
75	6·1	6·6	6·4	6·1	5·9

It will be seen that the expectation in the Temperance Section is slightly less than that of the Clergy Mutual, and for the most part slightly more than that of the Equitable. Speaking broadly, however, the three experiences are very similar.

When we compare the policy-holders in the Temperance

Section of the Institution with those of the Clergy Mutual and the Equitable, are we comparing people who are living under similar social, financial and general conditions, such as was the case when we compared the Temperance with the General Section of the Institution? Obviously not. The Clergy Mutual and the Equitable show a lower mortality than that of the average of Life Offices, and they do so because their policy-holders are drawn from special classes and live under exceptionally favourable conditions. The assured Clergy and their relatives, for the most part, enjoy moderate but certain incomes, fixed positions, and comfortable and healthy residences. A large proportion of them, especially during the earlier and greater part of the period covered by the experience, have lived in country parishes, cathedral towns, and collegiate centres. All of them are educated men, and understand the conditions of a healthy existence much better than less well-informed people. Most of them are relieved from the worries and anxieties which are inseparable from the competitive struggle for existence which the smaller of the middle class often find to be so severe. Their character and position ensure a careful life. A far larger proportion of the Clergy are Abstainers than is the case amongst assured men generally. Their longevity has always been notable, and they are admittedly a select and exceptionally healthy class.

The policy-holders in the Equitable are also a select class of well-to-do people, who reside in the healthiest parts of the districts in which they live, are able to have the best medical advice the moment it appears to be desirable, can take a rest or a holiday whenever they wish to do so, and are largely free from the constant worries and anxieties to which less comfortably circumstanced people are subject. Those of them who are in business probably have easy hours, and do their work amongst the most comfortable and healthy surroundings. The extent to which they are a special class is indicated by the fact that the average amount of policy issued by the Equitable is £1,170, while the average policy in the Temperance Section of the Institution is £299. The average policy in the Clergy Mutual is £761. Thus the average policy in the Equitable is four times as large, and in the Clergy Mutual two-and-a-half times as large, as the average policy in the Temperance Section of the Institution. That indicates a marked difference in the social and financial position of the policy-holders.

The policy-holders of the Clergy Mutual and the Equitable are persons who live under conditions which are exceptionably favourable to health and longevity. They live longer than the average assured person. The Abstaining policy-holders in the United Kingdom Temperance and General Provident Institution are far less favourably circumstanced. On the average they are smaller men financially than the average assured person. Apart from their abstinence from intoxicants, there is no reason why they should have a lower mortality than their colleagues in the General Section of the Institution, or than assured men generally. But, as a matter of fact, these far less favourably situated people, without any of the special and great advantages enjoyed by the clergy of the Clergy Mutual, and the carefully selected well-to-do of the Equitable, do contrive—by reason of their abstinence, I submit—to counteract, counterbalance, and rise above the difficulties and disadvantages of their circumstances to such an extent as to raise their expectation of life to the level of that of their more fortunate and more favourably placed fellow-citizens.

That some Non-Abstainers in stations of life which enable them to take advantage of many conditions which are favourable to health and longevity live as long as Abstainers who are less fortunately situated for complying with the conditions of physical well-being, has, however, little real bearing upon the subject under consideration.

It is not suggested that abstinence is everything; but simply that it is one of many conditions which produce a low rate of mortality. It would serve no useful purpose to attempt to determine whether an Abstainer who neglected or was unable to secure some of the other conditions of good health would live longer than a Non-Abstainer who carefully observed them, any more than it would to discuss whether a man who was under-fed but well housed and clad would live longer than one who was well fed but badly housed and clothed.

It may, however, be said that the statistics which have been presented do not prove that *extremely* moderate and careful users of alcoholic liquors will not live as long as similarly circumstanced Abstainers. Unfortunately, the material for making precisely that comparison is not available, and I am afraid it is not in existence. But if the use of alcoholic beverages be detrimental, if the ordinary moderate use of them do produce the difference in mortality which the statistics we have been considering disclose, it would be reasonable to anticipate that the injury done would be somewhat in proportion to the quantity taken. Persons who take *extremely* little would be likely to show a mortality more nearly approaching to that of the Abstainers than would those who took more, although still well within the bounds of what would be considered genuine moderation. Ordinary careful moderate drinkers would no doubt show a lower mortality than "free drinkers," and "free drinkers" than the habitually intemperate. It would, therefore, be no refutation of the contention which the statistics support—indeed, it would rather tend to confirm it—if it were shown that the mortality amongst a body of men who took alcoholic liquors very sparingly and with exceptional care approximated to that of Abstainers.

No doubt, if the most careful and moderate of the Non-Abstainers in the General Section of the Institution could be selected, they would show a lower mortality than the average of that section; and we should expect the mortality among the most abstemious of them—those who individually could be accurately described as being "almost an Abstainer," and "practically an Abstainer"—to approach very closely to that of the general body of Abstainers. It is also certain that a selection could be made from the lives in the Temperance Section which would show an even lower mortality than does the average of that section.

In this connection it may be observed that the mortality experience of recent years is more favourable to the Abstainers than was that of the earlier years in the history of the Institution. The difference between the rates of mortality in the two sections has always been very marked, but it has been greater during the last twenty years. In both sections the mortality has fallen as the longevity of assured persons and of the nation as a whole has increased; but the mortality among the members of the Institution has decreased more among the Abstainers than among the Non-Abstainers. If the contention were sound that Abstainers live longer than Non-Abstainers because they are more careful in other matters than in the use of alcoholic liquors, we should expect that, as the general health of assured persons as a whole improved, the rates of mortality in the two sections would tend to approximate. The tendency actually experienced is in the opposite direction. I suggest that the explanation is that the Abstaining Section has, so to speak, more abstinence in it than it had formerly. A larger proportion of those who now enter that section are life Abstainers, and a considerable number of them are the sons of Abstainers. We thus get the beneficial effects of abstinence shown more clearly and fully than was possible from thirty to fifty years ago, when the proportion who were life Abstainers was small, and those who were the sons of Abstainers were very few.

The comparisons which have been made are between the general body of the Institution's assured Non-Abstainers, who, when their lives were accepted, were careful and moderate in their use of intoxicants, and whose average mortality compares favourably with that of assured persons generally, and the Institution's assured Abstainers, similarly circumstanced as to occupation, place of residence, social position, habits of life and all other important conditions, save and except the use of alcoholic beverages. The practical issue upon which those comparisons were intended to bear is:—Is the belief that, *other things being equal*, abstinence from the use of alcoholic liquors as beverages is conducive to health and promotes longevity, supported by facts and experience? The summarised results of the carefully recorded and somewhat lengthy and extensive experience which have now been presented are submitted as a contribution in support of the view that an affirmative reply must be given to that inquiry.

SUPPLEMENTARY NOTES.

The Experience of some other Life Offices.

Although no other Life Office has a mortality experience in which the records of the Abstainers have been kept distinct from those of the Non-Abstainers for so long a period, and covering such a large number of lives as that of the Institution whose statistics have been the basis of the foregoing article, there are offices in Great Britain which have kept records of a more limited nature and for a shorter period. It is interesting to know that their experience, so far as it goes and has been made public, confirms the broad teaching of the tables we have been considering. Of course the total number of actual deaths experienced during a comparatively short period cannot be very usefully compared with the number which would appear to be expected according to the mortality shown in the standard tables which have been referred to. In a comparatively short experience the proportion of recent entrants will be larger than in records which extend over a much longer period. Further, as the majority of persons who assure do so in early middle life, the proportion who have reached the older ages, where the mortality naturally approximates more closely to the standard, is much smaller in a short experience than it is in a long one. It is also true that comparisons of the total number of deaths with the so-called expected number are only of limited value, and may be misleading unless we have the number of lives at risk and the deaths tabulated in groups of ages, as is the case in the article. Nevertheless the broad general results are interesting.

Below are given the total comparative experiences of the United Kingdom Temperance and General Provident Institution of persons who insured during the 13 years 1889–1901; of the Scottish Temperance Life Office during the 20 years 1883–1902; and the total experience of the Sceptre Life Office for the 20 years 1884–1903:—

UNITED KINGDOM TEMPERANCE AND GENERAL PROVIDENT INSTITUTION.

(1889—1901.)

			Per cent.
Abstainers .	. Expected Deaths, 432,	Actual Deaths, 180	. 41
Non-Abstainers .	„ „ 272,	„ „ 185	. 68

SCOTTISH TEMPERANCE LIFE ASSURANCE CO., LTD.

(1883—1902.)

Abstainers .	. Expected Deaths, 936,	Actual Deaths, 420	. 45
Non-Abstainers .	„ „ 319,	„ „ 225	. 71

SCEPTRE LIFE ASSOCIATION, LTD.

(1884—1903.)

Abstainers .	. Expected Deaths, 1440,	Actual Deaths, 792	. 55
Non-Abstainers .	„ „ 2370,	„ „ 1880	. 79

It has been pointed out that too much importance must not be attached to the comparison between the "actual" and the "expected" deaths in the short period experiences, although the fact that the mortality among the Non-Abstainers was in all cases considerably below the "expected" may be taken to indicate that the Non-Abstainers were at least good average assurable lives. What is of real interest and value is the fact that in each case the mortality among the Abstainers comes out very much lower than that of the Non-Abstainers as compared with the "expected." In each case the comparison between the Abstainers and the Non-Abstainers is, of course, for the same period. It will be noticed that the deaths among the Abstainers, as compared with the Non-Abstainers, were 24 per 100 "expected" fewer in the Sceptre, 26 per 100 fewer in the Scottish Temperance, and 27 per 100 fewer in the United Kingdom Temperance and General. The similarity of this superiority of the Abstainers is striking.

"Exposed to Risk."

"Exposed to risk" means the total number of complete years during which persons were on the books of the Institution. For instance, if a policy-holder were assured during all the years of his age 25 to 29, he would for the group of ages 25 to 29 appear under the head of "exposed to risk" as 5 years. If his policy were in force for three of those years only, he would appear as "exposed to risk" 3 years, and so on through each group of 5-year periods. The total of the column "exposed to risk" represents the total number of years during which all the persons dealt with were on the books of the Institution. It is obvious that, in order to show the annual rate of mortality at each group of ages, we must first ascertain the number of persons who were annually exposed to the risk of dying, and the column under the heading of "exposed to risk" gives the number of such persons for each group of ages.

The Mortality among Young Lives.

With reference to the irregularity in the mortality below age 25, which is shown in the tables on pp. 6 and 7, and referred to in the paragraph which follows them, it may be observed that in all the collections of assurance mortality experience the records at either extremity of life are meagre, and that is especially true of the young lives, among whom there are very few deaths.

In the records of the largest experience which has been tabulated in this country—viz. the British Life Offices Experience (O^M), already referred to in the paper, there are the following striking variations in the percentages of mortality at young ages:—

Age.	Rate of Mortality per cent. per annum.
10	·709
11	·792
12	·591
13	·137
14	·087
15	·367

Here we have the rate of mortality at age 11 nearly six times as high as at age 13, and nine times as high as at age 14. These irregularities are due entirely to the paucity of the material on which the rate is formed. The total number of deaths at these young ages among assured persons is very small. It is not surprising, therefore, that the rate of mortality experienced by the Institution at the young ages is also irregular. It is based on insufficient material, and importance must not be attached to it.

Printed by Hazell, Watson & Viney, Ld., London and Aylesbury.

b GFD
1904

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